THE IRON TRADE REVIEW

VOLUME XXV. CLEVELAND, O., MARCH 24, 1892. NUMBER 12.

THE IRON TRADE REVIEW.

A JOURNAL OF THE

IRON AND STEEL INDUSTRY, THE MACHINERY TRADE AND KINDRED INTERESTS

IS PUBLISHED EVERY THURSDAY BY

THE IRON TRADE REVIEW CO.,

27, 29 *and* 31 *Vincent Street, Cleveland, Ohio.*

TERMS, (strictly in advance):

One year	$3 00
Six months	1 50
Three months	75

Advertising Rates Furnished on Application.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER.

CLEVELAND, O., MARCH 24, 1892.

THE WEEK IN IRON CIRCLES.

General Features.

Another seven-days round-up and not an event of significance to the waiting and pondering iron interest. That vast store of grain that lured the pig iron men into their present plight is still moving from the Western farms, but there has been a suggestion in the last week, caused by the shrinkage of the export demand, that Europe's shortness is not as great as the speculators counted on. A quick response to this intimation was the dropping of wheat and corn another notch. Cotton still grovels, and wool, sugar and oil share the general inclination. Yet, in spite of this declension in prices, there is a manifest increase in the volume of business, as indicated in bank clearances. The South is gradually pulling up toward its record of corresponding weeks last year, and that, with iron and cotton at persistently low levels. Some of the coke furnace suspensions, promised in correspondence to this paper, are not yet due; but the furnaces that have blown out thus far are apparently nearly balanced by the resumptions reported from time to time, these latter being principally in the South. There is a sort of activity in the trade, to be sure—a demand that under ordinary conditions would be regarded as proof of prosperity. It is nothing to the contrary, that a rolling mill, for example, should refuse to buy pig iron; many mills have all they can do, on contracts taken months ago, and the material to complete these contracts was delivered at the mills, in many instances, before the new year began. But when stocks now on hand are worked up, all along the line, what then? The question is evidently not troubling pig iron buyers to any extent. At any rate, while every report about pig iron transactions—the few that there are—glaringly placards the legend, "Now is the time to buy," the mill men, the foundry men and the car wheel men refuse to be interested. Among pipe producers there is a slight picking up, though sales are yet on a low basis. Some of the contracts recently taken have been so low that pipe men are not encouraged to buy save for what iron is needed to cover their engagements. The output of pipe is said now to be 1,000 tons in excess of the demand—and there are indications that an effort will soon be made to return to some basis of agreement, like that of last year, that shall save the market from the ruinous cutting that comes of overstock. Cincinnati reports a disposition among leading producers, North and South, to let prices go to the bottom as quickly as they will, yet attempts to buy large blocks at a shade below current minimum figures have not succeeded. From the same source comes the word that, while greater concessions could be secured, without doubt, on large lots for immediate delivery and prompt cash, buyers are not in position to take advantage of such terms. Louisville salesmen find that purchasers are willing to buy for delivery the latter part of the year provided prices can be obtained on basis of $9.25 for grey forge at furnace. Some sales have been accepted at this price, as it is felt that there will be but little movement in iron for some time to come, owing to heavy stocks. For present delivery, prompt cash, sales are regularly made at prices shading $9 at the furnace. At Buffalo while contracts are being constantly placed for raw and finished material, it is in almost every instance at sacrifice prices. Many concerns, formerly large buyers of pig, report that their lessened consumption is due to smaller competitors quoting prices which they do not care to meet. The Chicago market is a grade lower in the slough by the recent offerings of furnaces that were obliged to unload and by the reported sale of a round lot of Northern lake ore, No. 2 foundry, at $12.50 Chicago. The deal, if made, is said not to have been to any actual consumer, and furnaces in that district will not sell their product at the price quoted, which is about $2 less than the grade has brought. Lake Superior charcoals are inactive at unchanged quotations. The extreme demoralization existing on coke metal extends only in a partial degree to charcoal, and present price of $17 Chicago, bids fair to be retained as a minimum during the Spring and Summer months, while two or three of the leading brands are firm at 50 cents per ton higher. The Detroit market has been actively canvassed by agents of the various Southern furnaces, but there were no transactions in foundry iron worth noting. Some orders for Lake Superior charcoal iron have been booked at present figures for May deliveries.

The Local Situation.

On nothing are the ore men so completely at one as on the utter hopelessness of any attempt to sell ore just now. The vessel interest, on its side, appreciates that the game must still be a waiting one, so that discussions of rates are not in order, when nobody is in shape to talk charters. There is no calculation on a particularly early opening. "I look for nothing before the 5th to the 10th of May," said a well-known lake man. "There's talk of low water, and of more ice now than there was in January." The dollar Escanaba rate and $1.25 from the head of the lakes are still quoted as a matter of history, some weeks old, but not as having any present significance.

Iron Ore.

While a certain movement of ore from the docks goes on, in fulfillment of engagements, there is absolutely nothing going on that would establish a basis of quotation. The statement of a valley furnace operator that he was offered standard Bessemer ore for '92 delivery at 25 cents per ton below last year's prices, provokes no little questioning among ore men as to the source of the tender. Representatives of ore firms who have recently mingled with Pennsylvania pig iron producers have but one report to make—that no concession in price would induce furnacemen to place their orders for ore. None of them said that the price was too high. All admitted that the concessions made last year from the 1890 list were reasonable, and that further reductions were hardly to be expected. But the future had no signs of promise that would justify season contracts now.

Pig Iron.

There was but one story told in the interviews referred to above. Every man talked with said that the present plight of the iron trade was the result of overproduction. Yet not one of them all was ready to say he had had enough; nor was there any proposition for concerted stoppage to curtail the output. Every man had some reason for thinking that he was peculiarly well situated to stand the pressure, while conceding that he had a weaker neighbor who would soon have to succumb. There is evidently no lack of appreciation of the fact that a crisis has been reached, but after the crisis, what? The wonder is that there is so general a disposition to go ahead as though no such interrogation point stood in the way. There is scarcely need to quote, but prices stand, as for several weeks, at $12.75 for grey forge in the valley, and at $14.50 to $14.75 for No. 1 Bessemer. These figures are from 75 cents to $1 too low for would-be Southern competitors.

Steel Billets.

There is a trace of improvement in the billet market. Transactions of the week show a range of from $23.75 to $24.50, at Cleveland, and Pittsburgh firms are not making the concessions recently reported. Muck bar is unchanged at $25 to $25.50. Old iron rails are holding steadily to the $21 of weeks past. Finished iron is in a trifle better demand, and quotations are made at $1.55@ $1.60 for bars. The mud blockade has made March trade a disappointment, on the manufactured article.

THE LATEST REVOLUTION IN STEEL MAKING.

The announcement is made at Pittsburgh that Carnegie, Phipps & Co. have, within the past week, introduced into their Homestead works a new method of making steel. Little in detail can be given about it; the most that the public is told is that the new method is the "direct process" of steel-making, that has been for some time in the experimental stage; that it will be revolutionary in its cheapness, and that notice has already been given the men in the departments in which it is to be used, that new wage scales will go into effect. The Pittsburgh *Dispatch* adds that the direct process yields four heats instead of two, in 24 hours, and that as the process can only be adopted at such a plant as the one at Homestead, "the firm expects a practical monopoly of the steel trade of the future."

This is a large claim, and one that will by no means be conceded. It is a suggestive coincidence, however, that four years ago this month, the manufacture of basic steel in this country, as a commercial product, had its beginning in the Homestead works; and all that the best appliances could do and that the highest skill could devise, has been at the service of this great interest. It is well to remember that the present state of the iron and steel trades, in which the struggle that is to determine the "surviving fittest" is on, in its intensity, is emphatically a revolutionary era, and that the revolutions are not apt to stop with one or to proceed from a single source.

MAGNITUDE OF THE LAKE SHIPPING INTEREST.

Some facts with a meaning, and with a distinct bearing on deep water-way needs, are contained in the Treasury Department's "Commerce and Navigation for 1891," recently issued. The Northern Lakes take a conspicuous place in the figures relating to the growth of shipbuilding in the last few years, and the comparison between the lake shipping interest and that of the Atlantic and Gulf coasts is one that will doubtless surprise some of the Washington statesmen, who look after their own Pigeon Creek and Ripple Run, in the river and harbor appropriation bill, but can't be persuaded that the lake traffic is more than a local affair. For example:

In the five years ending June 30, 1891, the lakes added 485,053 to the tonnage of the American merchant marine, as against 706,591 by the shipbuilding interest on the entire seaboard, in the same time.

The Northern lake ports were credited with 310 steam vessels of 1,000 to 2,500 tons on June 30, 1891, as against 272 one year previous; while the Atlantic and Gulf coasts reported only 164 and the Pacific coast and Western rivers, together only 49 last June. In other words, 60 per cent. of all the steam vessels of the tonnage named, belonging to the United States merchant marine, are owned on the lakes.

Of the total tonnage of vessels in the merchant marine of the country—4,684,758—the Great Lakes contribute 1,154,870.

Of 76 steel and iron vessels built in 1891, seaboard and river ports put out 41, lake ports 35, nearly one-half. Of the 35, Cleveland contributed 14.

These facts reinforce those gathered by C. H. Keep, of the Lake Carriers' Association, who has been engaged in putting statistics of lake commerce in shape for the Treasury Department. Mr. Keep's inquiries show that in the season of navigation of 1890 there were carried on the great lakes 30,299,006 tons of freight, valued at $342,522,290. This means all the freight that could be crowded on four tracks, side by side, running from San Francisco to New York, all full of loaded cars, bearing 15 tons each. This freight was carried an average of 566 miles, making a total of 17,149,237,396 ton miles for the season of 1890. The railroads of the country, in the year ending June 30, 1889, carried freight that represents 68,727,223,146 tons carried one mile. Thus the freight traffic of the great lakes was one-fourth that of all the railroads of the country. The economies of lake transportation are shown in this extract from Mr. Keep's report:

The saving to the public from lake transportation is best shown by comparing it with the cheapest known rail transportation. According to the report of the St. Mary's canal, 9,041,213 tons of freight passed through the canal in the year 1890, which was carried at an average cost to the shipper of 1.3 mills per ton per mile. The average cost to the shipper of rail transportation in the United States is stated by the statistician of the Interstate Commerce Commission in his second annual report at 9.22 mills per ton mile. The Erie Railroad, one of the largest coal carriers in the United States, collects from shippers on its coal traffic 5.4 mills per ton per mile. The Michigan Central Railroad, according to its last annual report, collects from shippers on its through traffic 5.02 mills per ton per mile. The last named figure represents the lowest cost of rail transportation in the United States. It is the charge exacted from shippers by one of the best equipped lines in the country on its through freight on which it has a long carriage and which consists in great part of exactly the same class of freight that is carried on the great lakes. If the freight carried through the St. Mary's Falls canal by water had been carried by rail at the lowest cost of rail transportation (5.02 mills per ton per mile), it would have cost the shipper $36,182,428. The saving to the public in a single year on Lake Superior traffic by the use of water transportation was $26,710,213. Applying the same comparison to the entire freight traffic on the lakes we find that the freight carried on the great lakes during the year 1890, if carried by rail at 5.02 mills per ton per mile, would have cost the shipper $86,088,171. Carried by water at 1.3 mills per ton per mile the entire lake traffic of 1890 was carried at a cost to the shipper of $22,294,008. Water transportation on the lakes, therefore, saved the public in a single year $63,794,163, or nearly double the entire river and harbor expenditures on the great lakes from the year 1789 to the present time.

It is amazing, in view of this clear dollars-and-cents demonstration of the actual achievement of the great lakes, that there should be any disposition anywhere to look upon this vast interest as anything less than national. The river and harbor bill that is now before Congress provides, according to a Washington special, for a $400,000 appropriation for the twenty-one foot channel—only a tithe of what Congress should be willing to put on this improvement in the next few years. The lake interest grows apace, while the cheese-paring statesmen sleep. What the country asks of them when the river and harbor appropriation bill comes up is a patriotic view of this question, that shall rise above the interest of a single constituency.

THE "IMPOSSIBLE" WAS ACCOMPLISHED.

"Cold Short," of the *Ohio Valley Manufacturer*, was singled out by one of the respondents to *The Iron Trade Review's* recent circular to furnace men, as the only man beside Benner who had any lien on the iron prophecy business. In coming back at this heartless reminder of his prediction last dog days, of $18 Bessemer iron by November, "Cold Short" says that *The Iron Trade Review* "set out, like Sisyphus of mythologic repute, to accomplish an impossibility, that of inducing the iron men to express an opinion regarding the present situation, which opinion, if candidly expressed, would stultify themselves and cast ridicule on their managment." Now, our own idea on this subject is that we succeeded excellently well in getting from one firm out of every two addressed, a candid statement of the situation, and from nearly as many, an expression of opinion as to the cause and the remedy. It does not "stultify" a furnace operator or "cast ridicule" on his management to discover that the powers in control of some 300 other furnaces had coincided with his judgment that the time was ripe for heavy production, and that demand would grow by what it fed upon.

It is usually considered the highest tribute to one's sagacity to have it so unanimously endorsed. That the iron makers of the country, without concert or pre-arrangement, all set their stakes for a year of unprecedented consumption, is good proof that there were signs of promise out. And there were. But now that '92 doesn't seem to be winging its way very rapidly to the banner place among iron years, the furnace men are not ashamed to say that there has been a mistake somewhere. The jar the Baring trouble of latter '90 gave the financial world, was fresh in mind when this deliberate judgment about the iron trade's future was taken by every furnace man for himself. There was no fever about it. It was not a case of manipulation by the bear interest. *The Iron Trade Review* believed that, since there had been no consensus of opinion before the present condition of things was arrived at, it would be a good plan to have such an expression while the trouble was on, to the end that the iron trade might become physician, as well as patient.

The diagnosis has been made, with no disagreement on pathology and very little variance as to treatment. The thing to be done now is to persist in applying it. If blowing out does not operate as a tonic to price lists, then it is to be presumed that the story told by the settling quotations on cotton and corn has an application to the iron trade, and that a low level stretches ahead indefinitely.

ANOTHER WORD ABOUT MESABA.

A reckless contemporary, published at Ishpeming, that seems to covet a reputation for zeal, at the expense of reliability, is troubled about the "First complete description of the Mesaba range," published in *The Iron Trade Review* of March 3. The red line containing the words quoted above, that appeared at the head of our issue of that week, was a sort of red blanket in our Ishpeming neighbor's eyes. It is straightway moved to say that the article—which, we repeat, is the "first complete description of the Mesaba range," yet published—was written in the interest of the stock brokers. *The Iron Trade Review* knows that it is not necessary among those who have long been its constituents to make any denial of this charge, that is as false as it is unjournalistic, but for the benefit of others who have not such an acquaintance with this journal, we have turned aside for a moment to say this word. This paper employed a reputable journalist, who had taken pains to make a careful investigation of

Mesaba developments, to give its readers the results of his inquiries. He was instructed to give the truth—neither to boom nor to minify; to write neither for the Mesaba interest nor to please owners of holdings in other ranges, who wanted Mesaba to come to naught. If what this paper gave, as the result of his investigations, does not please our Ishpeming contemporary, the fair inference is that petty jealousy of a new field has jaundiced its judgment. If we were disposed to compete with it in reckless assertion, we might say that the ores taken for its analyses were picked for a purpose.

The history of every new range has been but a duplicate of that which is now being recorded day by day about Mesaba. The jealous press of the Marquette range cried down the infant Menominee, and Gogebic and Vermilion took their turn, but all survived and grew great. It will not retard the development of Mesaba to repeat the old tactics; no more will the vociferation of the professional boomer take the place of the diamond drill and the blow-pipe in convincing capital as to its resources and its promise.

THE virtuous resolve of *Dixie*, that sleepless and able exponent of Southern industrialism, to steer clear of the Southern "booms" and "boom" engineers, is made emphatic in the March issue of that journal. "The time has never existed," it says, "when 'booming' was good policy for the South, and now more than ever is it the duty of right dealing journals to frown upon the methods of the boomers. There are hundreds, and, we fear, thousands of excellent business men throughout the North and West who hold in genuine but unmerited bitterness against the South, the losses brought upon their ventures by speculative sharpers, and the South has no greater obstacle to its progress than these same men, who, from their standpoint of personal loss, visit actively upon a section the denunciations which should be confined to the tricksters who entice and fleece them." There is certainly no "sectional issue" in this boom business. The special cult of imagination that finds town lots in cornfields is thoroughly cosmopolitan. The Western boomer and the Southern boomer would diagram alike on the phrenologist's chart. But the returns certainly indicate that the Southern species has been gifted with a larger endowment of compelling eloquence.

IT is freely predicted that the depression now existing will cause the shutting down of half the Southern furnaces. Many of these furnaces were built to boom new towns rather than to supply any demand for iron, and these are going to the wall first.—[Connellsville Courier.

Though the wish often begets the thought, neither the wish nor the thought seems unreasonable. Northern furnacemen are not to be blamed for their opinions of the attempt to melt all the Southern town lots into "pigs," but the economies the larger Southern furnaces have been developing in the past year must not be forgotten in figuring out the lifetime of that competition.

REDUCED CLEVELAND AND VALLEY IRON FREIGHTS.

Following the recent meeting of the Central Traffic Association representatives in Chicago, at which reductions were made in the freight rates on pig iron and on manufactured iron and steel, the Cleveland committee met and made similar changes. The rates on certain articles of iron and steel that have heretofore been rated in fourth and fifth classes have been changed to those of fifth and sixth class, respectively, making the reduction from 12½ to 15 per cent. For example, the rates from Pittsburgh to Chicago which were 20 and 17½ cents are now 17½ and 15 cents. The Cleveland committee made the following reductions in the pig iron freights from Cleveland:

Chicago, from $2 to $1.80; East St. Louis, from $2 50 to $2.35; Peoria, from $2 40 to $2.25; Milwaukee, from $2.30 to $2.25; Detroit, from $1.25 to $1.20. Eastern rates show these changes: New York, from $3.20 to $3.10; Philadelphia, from $3 00 to $2.90; Baltimore, from $2.80 to $2 70; Pittsburgh, from $1.20 to $1.15; Buffalo, from $1.20 to $1 10; Wheeling, from $1.20 to $1.15. To Akron, Youngstown, New Castle, Sharpsville and other valley points of same previous rating, there is no change from 60 cents. These rates go into effect March 28.

The reduced rates from Pittsburgh on pig iron, ferro-manganese, spiegeleisen, manganese ore, muck bar, billets, blooms, scrap iron and steel, borings, old rails, old car wheels and axles, wire rods, mill cinder and scale, ground iron ore, skelp iron, nail plate, tack plate and tinplate bars and cast iron pipe apply in carload lots of 12 tons and over, with the exception of cast-iron pipe, the rate on that applying to net tons. To Chicago the new Pittsburgh rate is $2.40; to East St. Louis, $2 75; Columbus, $1 70; Cincinnati, $1.80; Indianapolis, $2; Terre Haute, $2.40; Buffalo, $1.60; Milwaukee, $2.80.

On all the above articles except pig iron the Pittsburgh & Lake Erie road has made a rate of 70 cents per gross ton from New Castle, Pa., and Lowellville and Struthers, O., to Cleveland, Akron and Sterling, O. On pig iron, the rate is 60 cents. Between Uniontown, Scottdale, Fairchance, Oliphant, Dunbar, Connellsville, Johnstown, Pa., and New Castle, Pa., Lowellville, Struthers and Youngstown, O., the rate is $1 30 for the manufactured articles, $1.20 for pig iron and $1.05 for cinder and scale. From Youngstown, Struthers and Lowellville, O., to Bellaire, O., and Benwood and Wheeling, W. Va., the rates are 95 cents for manufactured articles, 75 cents for pig iron and cinder and scale.

SPIRIT OF THE TRADE PRESS.

INTERESTING POINTS FOR IRON-MAKERS.

Figuring on the Future of Southern Iron Industries.

The following extract is from the first of a series of papers in *Dixie*, by G L Luetscher, of Chattanooga, on "The Future of the Iron I dustries of the South." The writer says that he expects to point out in these articles the course the South must pursue in future to avoid the consequences of overproduction and mistakes of costs and unsuccessful efforts to make iron by methods and plants not adapted to local conditions:

"Coal washing, use of waste gases and by-products of coke ovens and charcoal kilns, careful selection of ores by magnetic concentration or jigging, crushing of certain ores and of limestone to suitable sizes and so forth, will all require expenses for buying machinery and building suitable plants; buying ores by the unit of metallic iron, careful examination as to contents of moisture, silica, alumina, phosphorus, analyses of fuel, fluxes and slag, etc., will demand the expense of a chemist; the engagement of one or more experts to decide what lines for a furnace may prove the best for a certain class of ore, which of various steel making processes will be the most appropriate for a given pig iron, even the building or leasing of experimental plants and experimenting—all that costs money, but money applied in these directions will be saving money in the long run. The reader will be astonished to hear that nearly one-half of the Southern blast furnaces are built on wrong lines—the owner losing money without ever finding out why. Many a furnace received the severest punishment by irregularities of the stock, and through ignorant management—the only thing that surprises, is to see how much the furnace and the pocket book of the companies can stand.

"In order to be one of the 'surviving fittest' the future iron and steel plant of the South must fill the following conditions: It must be located where the raw material can be had cheaper or equally as cheap as at a possible competing plant—or it must be located at a most favorable place for the distribution of the product by water or rail. Preferably, both these advantages should be combined. The raw material must be especially suitable for the desired purpose. The plant should have as large a producing capacity as possible, and all departments should be as close to each other as convenient, with a view for extensions. The plant again wants to be especially adapted to the raw material and have all the best modern labor-saving devices. Plenty of operating capital must be on hand, and the product must find a ready market without too sharp a competition. * * * * Why should not Southern steel gradually force Northern products out of the South at least? We can make any kind of steel here, and are bound to make it. With the help of all concerned we will surely succeed. Favorably located cities, which can prove that they can furnish pig iron in suitable quantities and qualities, ought to make every effort towards the erection of a properly constructed and rather large steel plant, and, to make a market for its product, attract all kinds of consumers of the intermediate product of blooms and billets, bridge and construction shops, boiler works, tinplate mills, etc. There is room for wire, nail and screw works, horse-shoe factories, hinge and novelty works. More than one rail mill might find a market, provided they can successfully compete with the immense works at Braddocks, Pa., Steelton, Pa., and Chicago—having an advantage against these places in freight rates anywhere South of the Ohio. By all means stop the building of new blast furnaces for some years. The steel industry is in its infancy yet in the South. In fact, it has barely overcome the stage of experiments. But so much has developed—steel can be made of suitable quality for any purpose whatever. It can also be made at a commercial profit in properly built works."

The World's Production of Pig Iron in 1891.

Returns of the production of pig iron for 1891 in the five great pig iron producing countries of the world—United States, Great Britain, Germany, France and Belgium—are at hand. The production of pig iron in these countries for the last three years is as follows:

	1891.	1890.	1889.
United States, gross tons	8,279,870	9,202,703	7,603,643
Great Britain, gross tons	7,228,496	7,875,130	8,245,336
German Empire, metric tons	4,452,019	4,563,029	4,524,555
France, metric tons	1,919,185	1,962,196	1,722,480
Belgium, metric tons	688,056	787,836	832,246

These figures indicate that, notwithstanding the reduction of production in the United States, in 1891, of nearly a million tons, we are still the largest pig iron producing country in the world, leading Great Britain in 1891 over a million tons.

In addition to these five countries Austria-Hungary produces annually about 925,000 tons; Sweden, 425,000; Russia, 650,000; Italy, 12 000; Canada, 75 000; Spain, 175,000, and other countries 59,000, a total of 2,312,000. Ignoring the difference between gross and metric tons in the tables given above, they would show a production in 1891 in these five countries of 22 567,626, and would indicate that these five countries produce about 90 per cent. of the world's production of pig iron, the total production being from 24,500,000 tons to 24 750,000 tons.—[American Manufacturer.

Only Eighty Per Cent. of Blast Furnace Cost Saved!

A new discovery in iron making is quoted by the New York *Sun* from *Iron*, which latter refers the statement to the Dusseldorf *Zeitung* as its authority. The German paper, having previously intimated that a very wonderful new discovery in iron making had been made, which statement was held to be ridiculously incredible, repeats the statement with the comment that "in due time all doubts will be dispelled." This statement is, in substance, that not only iron, but also other metals, such as gold, silver, copper, and aluminum, can be extracted from their ores by the new and infinitely cheaper method. When it is considered, it continues, "that the current generated by a dynamo driven by a small gas or petroleum engine will be capable of extracting day for day more metal than the largest blast furnace is able to produce, some idea may be formed of the radical changes which are likely to be the

result of the employment of the new process." The invention, which is more rightly described as an electro-technical discovery, was perfected three months ago. The inventor has succeeded in devising a practical process which has secured the ready support of a number of well-known American and German capitalists, who purpose forming a gigantic international syndicate. The assertion is made, further, that 80 per cent. of the cost of the present cost of blast-furnace methods will be saved by the use of the new discovery. It is hard to see how capital can be attracted by the small percentage of saving claimed; if it had only been 100 per cent. or 125 per cent., there would be some encouragement for investors. That such a claim would prove credible to some people is evident from the fact that in a neighboring city there is said to be some capitalists who are backing with money an inventor who claims to be able to produce, with a mechanical pump, a vacuum of 35 inches barometrical column. These things remind one of the Keely motor craze, and the claims for the iron process are convincing that the fools have not yet all emigrated from Germany.—[The Engineering Magazine.

How Birmingham is Fixing for Low Prices.

As bearing upon the capacity of the Alabama furnaces to withstand the pressure of low prices, an interesting fact has been communicated to us by the manager of one of the leading concerns. Four years since the coke consumption was between two and 2¼ tons per ton of pig. Two years later it had been brought down to 1¾ to two tons, and now it ranges between 1⅓ and 1½ tons per ton of iron. This in itself is a very creditable showing and has told, by making the net earnings of the last year, in spite of lower prices for iron, a little larger than they were during the preceding year. The Birmingham iron makers, too, are going into the washing of coal, realizing that the outlay for improving the quality of their coke will be more than compensated for by decreased fuel consumption, more regular furnace working and a better quality of iron, reflected in an increased percentage of the higher grades. Should the consolidation be effected, then the new concern may be expected to take hold vigorously of the question of finding an outlet for its pig iron product in the steel business. We have reason to believe that that would be regarded as the first field to enter, and it is not unlikely that the rail trade may be singled out for attack.—[Iron Age.

QUESTIONS FOR TRADESMEN AND ARTISANS.

Underground Transit an Imminent Problem.

While the subject of rapid transit in large cities has not reached a solution in this country, it is very noticeable that the large European cities are apparently solving the problem to their satisfaction. The extensions which are soon to be made in the underground system in London, and the large system which is to be constructed in Berlin at an early date, indicate that they regard the underground plan with favor. This system, without question, has some very strong points, and the enormous expense connected with it is probably the main reason of its not having been introduced into this country. It begins to look as though this was the only practical way out of the difficulty as it exists in some of our large cities. It has been very thoroughly demonstrated that the elevated road cannot take care of the business in New York City, and it will probably be a very short time before the condition of affairs will compel the furnishing of additional facilities, and some form of the underground system seems to be the only practical one. It is a very noticeable, as well as admitted fact, that in European cities, such problems as this and the elevation of railway tracks entering the cities, are solved in a much more substantial and permanent manner than in this country. The London & Southwestern Railway through the city of London, which was described in the *Railway Review*, of March 12, is an excellent illustration of the manner in which these things are done. One great difficulty which would be encountered in this country if such a work was attempted, is the impatience of the public. It is stated that ten years were occupied in the completion of a piece of track one and three-quarters miles in length in London.—[Railway Review.

The Ancient Fuel Scare.

A few years since some learned men predicted an impending failure of the coal supply, owing to the immense quantity being mined for manufacturing and other purposes. They showed by the proverbial truthfulness of figures that the supply was limited, and that mankind at the then present rate of consumption would soon be without fuel in the form of coal. No doubt these men would have been much relieved could they have forseen the improvements that came later on in the steam engine, in furnaces, in stoves, in fact, in pretty much everything in and about which coal was used for producing heat; improvements by which a much greater percentage of the heat of combustion is utilized than formerly. But there would have been little cause for felicitation in this respect, could it have been seen at the same time that more coal per individual would be burned to-day than ever before, which we believe to be true. People warm their houses better, and the cheaper price of manufactured articles and goods, due to the wonderful improvement in manufacture and to the more economical use of fuel, have placed such things at the disposal of the many instead of the few. We do not, however, believe that there is imminent danger of exhausting the supply of coal. There was, perhaps, some mistake in handling the figures. So long as men get plenty of work at good wages, or opportunities to work for themselves, enabling them to try to supply their needs and tastes, coal will be mined in an increasing ratio, and if it does become exhausted other sources of heat will probably be found.—[American Machinist.

A Government Made Department.

Charles Richardson, of Boston, writes to *Hardware* on the establishment of a department of the National Government to be known as the Department of Trade and Commerce, to which manufacturers and merchants can refer, when matters of importance arise, requiring consideration by Congress. "The rapid and unparalleled growth of business in this country has been greater than the most sanguine person could have anticipated, and with this increase we have neglected to provide for the merchants such a department as their best interests and those of the country at large require. It is true, we can appeal to our members of Congress, but they likewise are overworked and cannot devote the necessary time to investigate our needs as fully as their importance often requires. Business men throughout the country are beginning to realize that something ought to be done in regard to this matter and now earnestly petition Congress to listen to their appeal. The need of such a representative of trade is even now seriously felt and will not grow less as time advances. Petitions are being circulated among different trade organizations, and I shall be pleased to send one to any who may be interested."

A Question of Good Nature About "Ads."

Naturally some dealers in making inquiry for goods, will mention the paper in which they saw an "ad." One firm carrying a large line of advertising variously distributed, have summarized their replies with the following result: One person in six mentions the paper in which he saw the "ad." When there is a direct request mentioned in the "ad." to "mention the paper," one person in four will comply with it. Human nature is variable, and it is only one person in four or six who is good-natured enough to do gratuitously what the other fellow desires of him.—[Hardware, New York.

Electric Heating Apparatus Making Headway.

One concern alone that supplies electric-heating apparatus has received orders for it from 60 electric street railways for use this Winter. It has long been the practice to light electric cars with incandescent lamps fed directly from the overhead trolley wires, and a large proportion of the 400 American electric roads are now so equipped. As a further stage of evolution, the electric car-heater has become a necessity, and its success is firmly established. As a matter of fact, its use on large electric roads has not been found to make any perceptible difference in the coal consumption at the power house—*i. e.*, the current required for the heaters does not appear to add anything to the amount of current normally required to operate the cars under ordinary conditions when no heat is wanted. This has been tested a good many times with invariably the same result, showing that the heating current is an inappreciable addition to the average "load" of the station. It has been objected that as the electric heaters now cost four or five times as much as the common car stove, the chances are against their introduction. This does not prove to be the case at all. Coal stoves occupy at least the space of one seat in the car. It is not pleasant to sit next to them; it is equally unpleasant to face them. But the electric heaters go under the seats, like steam pipes, and the only sign of their presence is the steady warmth that they engender. This employment of electricity is already so general that several kinds of apparatus are competing in the market, and so many improvements have been made that it is now seriously proposed by one of the largest steam railroads in the country to use these heaters on such of its cars as are now lighted electrically. —[Engineer and Iron Trades Advertiser, Glasgow.

Michigan Iron and Copper at the World's Fair.

The mineral exhibit from Michigan is sure to attract much attention. This will include, besides extensive collections from museums, etc., granites, marble, and other building material of rare and beautiful qualities, but which have not yet been marketed to any great extent; raw material from the iron mines in plates 69 to 70 per cent. pure as taken from the mines; and especially specimens of copper, which in its pure state is found only in the Michigan mines. A copper exhibit, the "largest and most extensive ever attempted," will be made by the Calumet and Hecla mines. In speaking of it, the company's chemist says that it will include "obelisks of pure copper ranging in weight from 50 to 500 pounds, also quantities of wire and sheet copper that has been drawn and rolled from the native metal just as it was taken from the mines; rods of copper bent into different shapes, and even tied into knots, as one would tie a cravat, without breaking or splintering, as would be the result of such an operation on the copper produced by other mines and containing an alloy, which renders it less ductile. A curious fact concerning the silver deposits sometimes found in the copper, is that nature has welded the silver and copper together without mixing them, whereas no process has ever been discovered by mineralogists by which the same thing can be done artificially; examples of this phenomena will be included in the exhibit."

Falling off in Great Britain's Iron Output.

The current issue of the Bulletin of the American Iron and Steel Association, says: We are indebted to Mr. J. S Jeans, Secretary of the British Iron Trade Association, for the following statistics of the production of iron and steel in Great Britain in 1891, compared with 1890:

Articles—Gross tons.	1890.	1891.
Pig iron	7,875,130	7,228,496
Bessemer steel ingots	2,014,843	1,642,005
Bessemer steel rails	1,019,606	662,676
Open-hearth steel	1,564,200	1,514,538

A BULLETIN on the manufacture of cast iron pipe has been prepared by Dr. Wm. M. Sweet, special agent in charge of manufacturing statistics of the census bureau. In 1890, 36 establishments in the United States reported cast iron pipe making as a leading specialty. Total capital invested, $14,300,933. Hands employed, 7,788; wages paid, $3 794 407. There were consumed by the pipe foundries, 591,258 net tons of pig iron, costing $7,860,408. The output was 513,030 tons valued at $12,556,315.

THE Akron Tool Co. have made the following agencies for the sale of their Akron tubular steel barrows. Dodge, Haley & Co., Boston, Mass., for New England; W. Dodman, 103 Chambers street, New York; Riehle Bros. Testing Machine Co., Philadelphia, Pa; R. L. North, Jr., 154 Lake street, Chicago, Ill.; Chas. L. Pierce & Co., San Francisco, Cal.

ORE TRADE AND MINING NOTES.

The ore docks at Thornburg on the Valley road, built last Summer by the Western Terminal Co., of Cleveland, are to be greatly extended the coming season. The Western Terminal Co. owns a large tract of land that will be filled up with switches and trestles.

A Duluth special to the St. Paul *Pioneer Press* says: "The Lake Superior Iron Co. have purchased an interest in 4,500 acres of land of A. J. Trimble and Frank Hibbing, on which the bonanza find in township 58, range 20, recently discovered by Frank Hibbing is located, for $150,000. Some of the land is also located in township 57, range 21. The company is capitalized at $5,000,000, in shares of $25 each. The incorporators are W. D. Vernam and William Munro, West Superior; William H. Buffum, New York; A. J. Trimble and Frank Hibbing, Duluth. The officers are: William F. Mattes, manager West Superior Steel plant, president; Peter Deyo, president Douglas County bank, treasurer; W. D. Vernam, vice president; A. J. Trimble, secretary. With these the following gentlemen are directors: Frank Hibbing, Duluth; James H. Agen, West Superior, and George C. Squires, St. Paul. This company has one shaft forty-five feet in clean ore of Bessemer grade, and a number of other pits being sunk through the ore body. The ore is found from three to six feet beneath the surface."

The Crystal Falls *Diamond Drill* says that the Claire mine, once known as the Manganate, and idle since 1890, is to be operated at once. "The Claire is one of the largest mines in the Crystal Falls district and when in operation furnishes employment to a large number of men. There are two shafts on the property and a large open pit, and it is estimated that an output of 300,000 tons could be easily achieved during the shipping season. The Claire is the property of the Schlesinger syndicate."

The Monitor mine, at Crystal Falls, Mich., will be sold at auction March 25, to satisfy the $40,000 judgment of Forsyth, Hyde & Co., Chicago furnace men. It will probably resume operations. The mortgagees are paying off labor claims.

Reduced output is the order at the Chapin mine, the local management having received instructions to reduce the output one-third, that is, to about 1,200 tons per day. As a result of this order about 200 men have been discharged.—[Norway Current.

Ledge has been encountered in the exploring shaft of the Cleveland Iron Mining company in the northern part of this city, at a depth of 90 feet. It proves to paint rock, and the presence of this material is looked upon as favorable for the finding of ore. It would be better than town lots for the people of Ishpeming were this hope to be realized.—[Iron Ore, Ishpeming.

A party of Boston and other Eastern capitalists have been looking Iron Mountain over, says the *Iron Range*, with a view to establishing a large steel plant. They represent $60,000,000 capital and at their request a committee of citizens has been appointed to correspond with them and to present inducements to located.

A trip up the docks on either side of the river shows but little work being done, although considerable ore, for this season of the year, is being shipped, the Lake Shore orders now amounting to 100 cars per day on an average.—[Ashtabula Telegraph.

Fifty-nine iron mining companies have been incorporated in Minnesota up to date, and all of the new range has not yet been taken.

The Mastodon Iron Co.'s mine in the Crystal Falls district has made a total lake shipment of 370,000 tons, and is said to be good for as many more.

The Higgins Land Co. leased 50 40-acre tracts of land in township 58, range 16, at the Roucheleau Iron Co. for a bonus of $100,000 for 30 years and a royalty of 30 cents per ton on all iron ore taken out. The most prominent firms in the Roucheleau Iron Co. are Strycker, Manley & Buck, Coffin & Warner, and W. C. Sherwood & Co. Development of the new property will begin at once.

Mancelona and Cadillac (Mich.) papers note the resignation of Edward FitzGerald, Manager of the Antrim Iron Co. to accept the position of General Manager of Mitchell Bros.' lumber operations in New Mexico. In his six years' connection with the mining interests of the Antrim company, Mr. FitzGerald, so our contemporaries say, has done much to push them forward and his departure is much regretted.

A great deal of nonsense is talked about mining Mesaba ore with steam shovels, "blanket formations," etc. Mesaba ore, it will be discovered, will come to the surface in about the same way that the soft ores of the Marquette, Menominee and Gogebic ranges get there. On the other hand there is no disputing the fact that an immense and wonderful deposit of non-Bessemer hematite and limonite has been discovered on this already famous range. Nor will it have to be picked over in mining, as has been asserted here, no greater trouble will probably be experienced in mining it clean than is experienced in some of the valuable soft ore mines of the older ranges. The main fact against it will be found its quality. Much of it is limonite and from its chemical composition cannot possibly run over 60 per cent. iron.—[Marquette Mining Journal.

The Gun Flint Lake Iron Co. will be incorporated immediately by John Paulson, O. D. Kinney and Marcus Johnson. The capital stock will be $100,000. This company owns property in township 65, range 4, Eastern Vermilion range. It is of the well-known Mayhew tract, about two miles from the boundary line and 12 miles from the present terminus of the Port Arthur road, which line will be extended across the border this Summer. There is said to be a fine outcropping of magnetic ore.

The Bessemer (Mich.) *Spirit* says that D. A. Bennett, Superintendent of the Anvil, has sold the Federal mine, on the Gogebic range, to Detroit men. It can ship 50,000 tons in the season.

There is great consolation for Vermilion mine owners, should they need it, in the fact that though Mesaba ores may be mined cheaper as a result of their being in a horizontal instead of perpendicular bed, they will never command the price that Vermilion 69 per cent. ores will. They are good enough for us, and 40 acres of it is sufficient, too.—[Vermilion Iron Journal.

The Buckeye Iron Mining Co. has gone to pieces and a good many Marinette, Mich., people who bought stock from the ground-floor operators are out their investment. Florence *Mining News* thinks the property will yet fall into good hands and be worked to pay.

C. H. Cady, of Cleveland, recently general manager of the great Chapin mine, on the Menominee, was on the Mesaba range this week. He maintains that the ore can be mined cheaper than any he ever saw before.—[Vermilion Iron Journal.

At Duluth, Lawyer W. N. Draper sues to have a deed for iron land valued at $100,000, owned by James T. Hale, Alfred Merritt and others set aside because in the transfer his contract for a one-third interest in case of winning a pending suit was overlooked. B. F. Moore, of Minneapolis, sues John McKinley to set aside the deed to valuable iron lands which he had sold to McKinley for $250 an acre, alleging fraud.

The Standard Trust Quits—Another Big Combine.

Nearly 300 stockholders, representing 736,720 of the 950,000 shares of the properties held in trust by the Standard Oil Trust, assembled in the Standard Oil Co.'s building, 26 Broadway, New York, Monday, March, 21, and adopted a resolution dissolving the trust. John D. Rockefeller presided. The resolution calling for the dissolution of the trust had been prepared by S. C. T. Dodd, the solicitor of the trust. It was Mr. Dodd who, on January 2, 1882, framed the articles of agreement on which the great Standard Oil Trust was organized. The resolution provided that the affairs of the trust be wound up by John D. Rockefeller, Henry M. Flagler, William Rockefeller, John D. Archbold, Benjamin Brewster, Henry H. Rogers, Wesley H. Tilford and O. B. Jennings. A legal title to the stock will be secured by a distribution to holders of trust certificates, each stockholder to receive his due proportion of all the stock in the various companies. Of the 30 corporations in seven States, 10 or 12 will be wiped out entirely or merged in others. The winding up of the affairs of the trust will require about four months. The step is taken in view of the recent decision adverse to the trust, by the Supreme Court of Ohio.

The plan for the reconstruction of the Richmond & West Point Terminal Railway & Warehouse Co., a deal comparable in the vastness of the interest involved, to the Reading combine, has been presented to the security holders of the system. It provides for a total issue of $350,000,000 of securities, of which $150,000,000 will be 4 per cent. first mortgage, 35-year gold bonds, interest payable quarterly from March 1, 1892. Of this amount $10,000,000 will not be used for reorganization purposes, but set aside for the acquisition of additional property. Preferred stock will be issued to the amount of $70,000,000. It will bear 5 per cent. dividend, non-cumulative. The amount of common stock will be $110,000,000. These securities will be issued in exchange for the Terminal Co., the Richmond & Danville Railroad and the East Tennessee, Virginia & Georgia Railroad, that are in the hands of the public or owned and controlled by the Terminal Co. The present fixed charges, including car trusts, amount to $9 474,837 per annum, against net earnings of $8,744,736. The fixed charges under the proposed plan will amount to $6,400,000, to which must be added rentals of $1,260,000, making the total fixed charges $7,660,000. On the basis of the present earnings this would leave $1,000,000 applicable for dividends on the new 5 per cent. preferred stock. In view of the pending litigation affecting the Central Railroad & Banking Co., of Georgia, that concern is not included. The most important changes are the resignation of Mr. John H. Inman from the presidency of the Terminal Co. and of the Richmond & Danville, and the selection of Mr. W. G. Oakman as his successor, the latter gentleman also succeeding General Samuel Thomas in the chairmanship of the East Tennessee, Virginia & Georgia Co.

Another Remedy—Stop Furnaces on Sunday.

The following, on pig iron over-production, was received too late to take its place with the other letters to this paper. It is from Means, Kyle & Co., Hanging Rock, O.: "Our coke furnace has been out of blast since the middle of June. Our charcoal furnace will be blown out as soon as the charcoal on hand is used up, which will be within 30 days. As a remedy for the present demoralized condition of the pig iron trade, we would suggest that all the furnaces stop Sundays, and thereby reduce production one-seventh. Let some of the reverend gentlemen, and the good Presbyterian deacons, and all others, who are making such strenuous exertions to get in seven days in the week, in order to have a little spare cash to send to the missionaries and found public libraries, stop their furnaces on the Lord's day, and no other remedy will be needed."

F. B. Richards, Manager, writes on behalf of the Buena Vista (Va.) Iron Co.; "Replying to your circular reference to the iron outlook, would say our furnace has been banked since December 16, 1891, and there is no immediate prospect of our starting up again. There is too much iron being made and, from the present outlook, we can not see any improvement in the near future unless a large number of furnaces shut down."

THE *Tribune* Almanac for 1892 is like its predecessors in containing a vast amount of material valuable to the student of politics and practical political economy. It adds some particularly timely features. One is the coinage of the United States for every year since 1795. The other is the circulating medium of each kind and the total amount per capita for each year since 1860. There is a perpetual calendar and a great mass of exceedingly useful tables and statements.

A COMPANY has been formed at Havre for the manufacture of nickel. It is having a factory constructed on the Tancarville Canal, and has concluded an important contract with the government for nickel-plating Lebel rifles. The mineral used has hitherto come from New Caledonia, but is henceforth to be imported from Canada.

THE DAWSON GAS ENGINE.

Henry Thomas Dawson, of Salcombe, Eng., has secured a patent in this country on a gas engine, of which two illustrations are presented on this page. An improved gas engine, suitable for high speed, has four stages in its cycle of action. First the cylinder takes its charge during the outward movement of the piston; second, the charge is compressed by the return of the piston; third, the charge is fired and the effective outward movement of the piston takes place, and, fourth, the products of combustion are discharged while the piston returns. This cycle is attained in the Dawson gas engine without the use of valves or slides, the piston itself operating as valves, and, besides reciprocating, it entirely revolves once for each cycle of the engine.

Fig. 1 in the annexed illustration is a front elevation; Fig. 2 is a vertical section. In both, *a* is the cylinder. It is water-jacketed to keep it cool. The

Fig. 2.

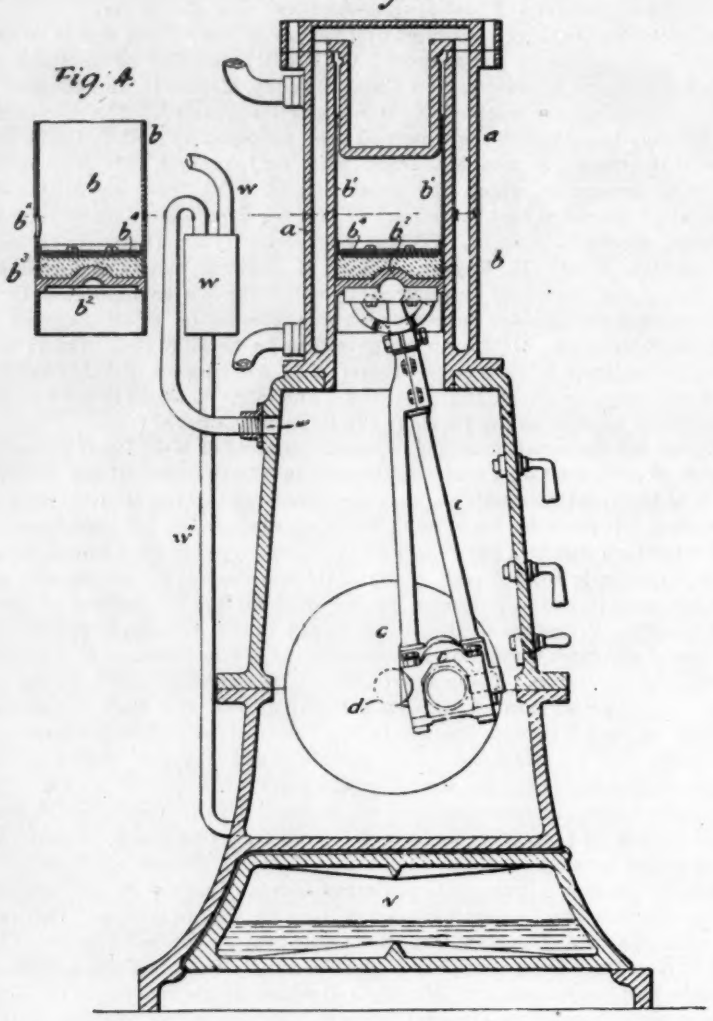
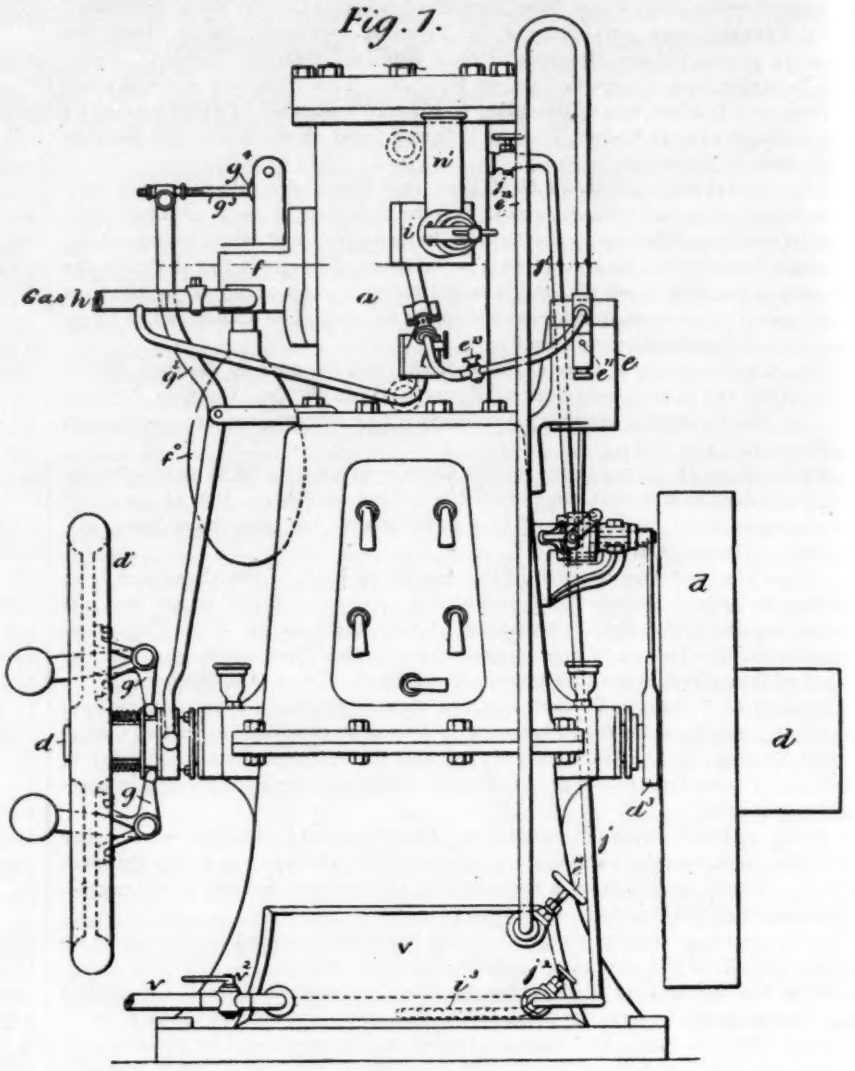


Fig. 4.

Fig. 1.



THE DAWSON GAS ENGINE.

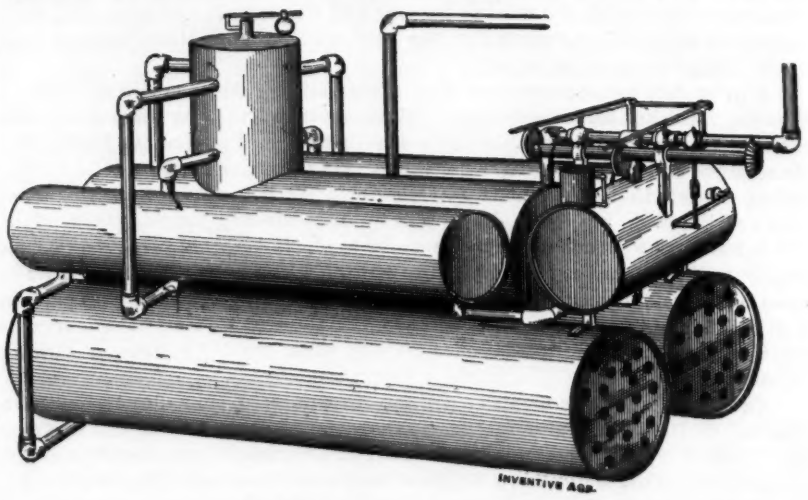
cylinder contains a piston *b*, which, by a connecting-rod *c*, drives a crank on an axis *d*; *d'* *d'* are fly-wheels, and d^2 is a belt-pulley; d^3 is an eccentric on the axis actuating an air pump *e*, which supplies the jet of air for forcing the furnace. *f* is a casing containing a valve which opens for the admission of air and gas to the cylinder. f^0 is an elastic bag serving to maintain a uniform gas-pressure. *g* is a governor controlling the gas and air supply. *h* is the gas-supply pipe. *i* is the ignition apparatus. *k* is the exhaust or outlet from the cylinder. The crank and connecting rod are enclosed in a chamber and a lubrication is effected by oil or lubricant being placed in the crank-chamber and distributed to the main working parts by the motion of the crank. The piston is tubular and about twice the length of the stroke. The piston tube *b'* is closed by a diaphragm b^2, located at about the fourth of its length from the outer end of the tube. The inner face of the piston diaphragm b^2 is covered with asbestos or other non-conducting material, b^3. The cylinder is about three times as long as the stroke. It has long ports about its center part. These ports extend spirally in the cylinder walls for somewhat less than the length of the stroke. The cover or upper end of the cylinder *a* is made to extend into the tubular piston, as is seen in Fig. 2, so as to leave only a proper space for compressing the charge. The cover contains water, and water-passages are formed upon the cylinder, the whole being in connection with a cistern. The water is admitted from the cistern at the bottom of the jacket and flows out at the top to return to the cistern, and so a continuous circulation is maintained.

The heating of the furnace-chamber and the capsule when at work is performed by the combustion of gas, which enters by a regulating-cock. It enters a tube and is urged forward by an air-blast. The gas and air mixed together pass on into the furnace-chamber, where they burn. The ignitor is started by holding a light at the top of the chimney.

This construction and arrangement of igniting apparatus insure certainty of ignition. This results from placing the open end of the capsule near to the charge to be fired. The blast keeps the capsule in a state of incandescence and causes a great intensity and rapidity of ignition necessary for high speed. The inventor has also made provision for starting the engine without the use of the air pump. The claim made for the new engine is in brief, the combination of a cylinder, a piston, means for reciprocating and continuously rotating the piston, ignition apparatus, and entrance and exhaust ports controlled by the piston, whereby, by the action of the piston, the form-fold operations embraced in the engines cycle of action are performed, as outlined in the opening paragraph.

STEAM GENERATOR WITH FEED-WATER DEVICE.

The improved steam generator on which letters patent were issued to Samuel S. Fleming, of Sarversville, Pa., in February, 1891, was followed February 2, 1892, by the patenting, by the same inventor, of a feed-water mechanism for steam boilers. The former of these inventions, which is shown in the accompanying cut, has to do with steam generators employing sectional boilers. The generator embodies simple and improved means for effectively supplying water to it while it is in use, the boiler sections being readily connected or separated for the purpose of transportation or for adapting the number of sections to the power required. It has the advantages also of simplicity, inexpensiveness and durability. The illustration shows twin boilers provided with flues and adapted to be placed upon any suitable setting. Twin



INVENTIVE AGE.

water tanks, cylindrical and extending longitudinally with the boilers, are placed over the latter and a dry steam drum is interposed between these tanks, with its lower circumference resting upon the boilers. This dry steam drum is thus placed, in order that the steam may be better reheated as it passes out to the engine, and also to give compactness to the whole structure. A vertical steam-receiving dome is mounted upon the top of the forward portion of the dry steam drum and receives the steam directly from the boilers through pipes. Any condensed steam will be carried off through lateral pipes leading down to the tanks, while the live steam passes on down through pipe leading

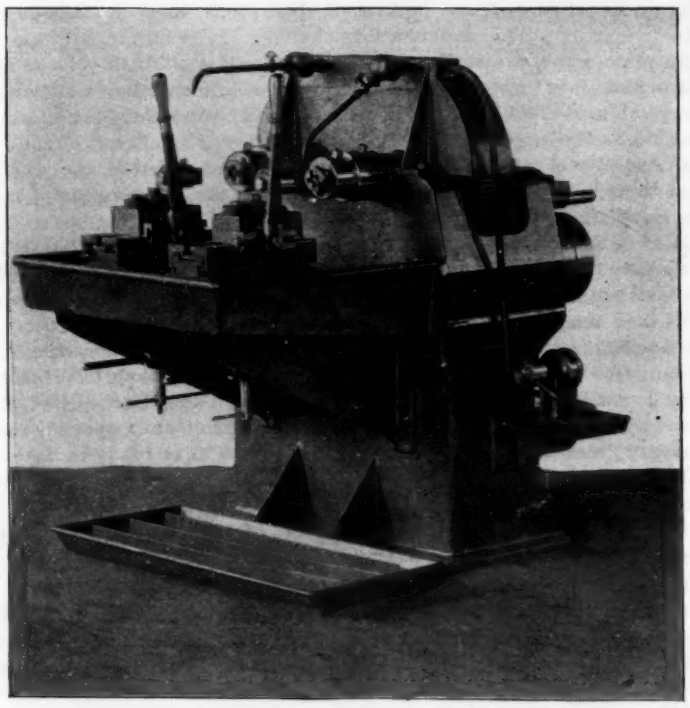
into the front end of dry steam drum. The water tanks and dry steam drum are shortened at the rear ends to accommodate an auxiliary water cylinder or tank, placed transversely over the rear ends of the boilers. The supply of water enters the top of this tank through valved pipe and branch pipes to the water tanks, thence through these tanks into the boilers through branch pipes. It is then generated into steam, which rises into dome, thence pases down through pipe and out through dry steam chamber and up through pipe to the engine. The generator will be made of 10 or 12 inch tubing—all pipes to be fitted with unions, so as to be readily taken apart, for convenience in handling.

The contrivance for automatically supplying the boilers with water is indicated in the upper right-hand portion of the cut. The auxiliary water tank, which is placed transversely over the rear ends of the boilers, has a dome, which contains a float. The float actuates a governor-valve through the medium of a bell-crank lever, fulcrumed in the side of the tank and a vertical rod. The latter is provided with a turn-buckle for adjusting its length, and hence regulating the amount of cut off to the valve and the supply of water to the tank. The dry steam cylinder is connected with the pipe and tank through short vertical pipe. The flow of water from the auxiliary tank through pipes is regulated by a valve, which is operated by a rod connected to lever, whereby both the valves are opened simultaneously, one to draw off the water and the other to admit steam into the tank to overcome or balance the back-pressure from the boiler.

A SOLID DIE BOLT MACHINE.

The mechanism so well shown in half tone, on this page, is a solid die automatic bolt, threading and special tapping machine, manufactured by the Webster & Perks Tool Co., of Springfield, O. The makers had had a long experience in the manufacture of screws and bolts, with nearly all styles of screws and bolt threading machinery, and had met with the same difficulty as other manufacturers, in turning out large quantities in the least possible time, from the rough iron. This led them to manufacture a machine of their own, which, they claim, is more reliable, than it is possible for any open die machine to be.

The Webster & Perks make is constructed for expedition: the extreme change from the shortest and smallest bolt to the longest and largest can be made in one minute. In making these changes, it is only necessary to stop



the spindle on which the change is desired. It is possible, also, to use part of the spindles for special or other tapping, while the rest are threading bolts or studs, arrangements being made in the simplest way for all kinds of special fixtures for threading and tapping purposes. Dies for these machines are said to require less than half the steel necessary for an open die machine. In tapping nuts, there are from two to four nuts on the cutting part of the tap at the same time.

There are three sizes, of two, four and six spindles, respectively. They are furnished with counter-shaft, pulleys and hangers, oil pumps and all necessary oil pans and strainers.

Prices But Little More Under Tin Tariff.

From what can be learned regarding the situation in the United States, the interests of the canning industry there have not as yet been seriously injured by the increase of duty under the McKinley tariff, for the prices of tinplate are only a very little higher there now than they were before the duty was increased, while the export prices in Great Britain have been reduced 25 per cent. or more in order to meet the increased duty. Two years ago when the duty was only one cent per pound, coke plates in New York cost $5.20 per box, while at this time with the duty at two and two-tenths cents per pound, the cost of the same article there is but $5.35, an increase of but 15 cents. Of course the Welsh producers, not the American consumers, pay the duty.—[Canadian Manufacturer.

KING'S HAND POWER ROCK DRILL.

A new hand power rock drill, manufactured under patents by the King Rock Drill Co., of Pittsburgh, Pa., is the most practicable one yet made, its inventor claims. Where mines or quarries are not located so as to get fuel at low cost, or where the investors are not warranted in buying the expensive steam and compressed air drills, the invention illustrated herewith exactly meets the need. The King drill is at once light, easy of operation and durable, as will appear from a study of its construction. It is made of cast and

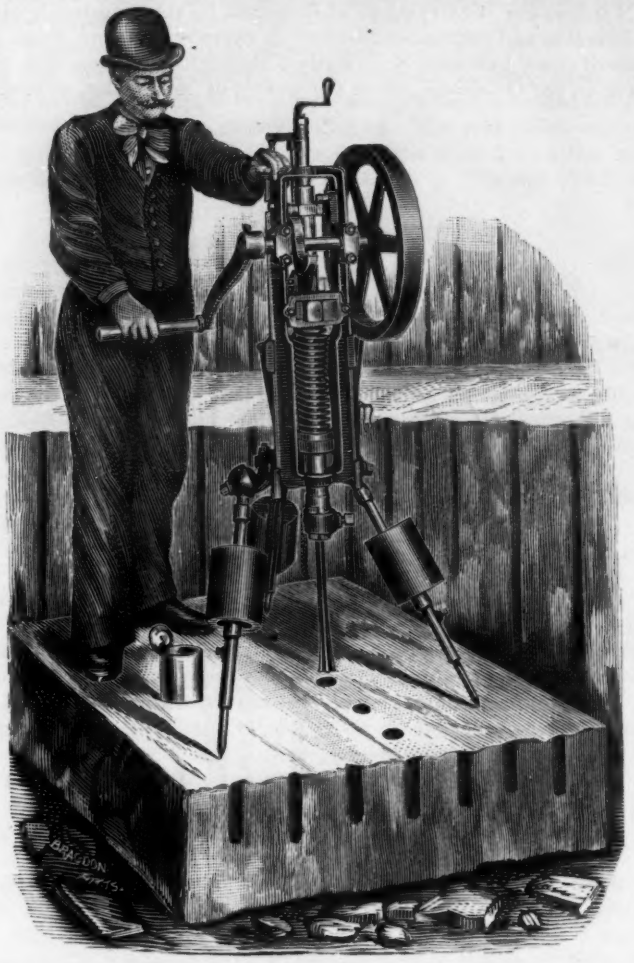


FIG. 1.

machinery steel, the drill and all wearing parts of machinery steel, case-hardened, and the tripod of hydraulic pipe, with steel points.

The force for driving the drill is derived from a spring which is alternately compressed and released by rotating S-shaped cams under anti-friction collars. This spring requires a force of 300 pounds to compress it, and the reaction is equal to the work of a 3x3 inch cylinder working with 40 pounds of steam or air, but owing to the peculiar shape of the cams and their arrangement, a boy can easily run it at the rate of 200 strokes per minute.

The drill steel is an extension of the drill bar, and the cross-head, or part which carries the drill bar, spring and cam shaft, works in a gibbed shell or guide, which is, in turn, mounted on a tripod, column or drift bar, with a universal joint or swivel, which allows the drill to be pointed at any desired angle for drilling, according to the work to be done. The ball joint with which the tripod is equipped permits of its being worked at any angle or in any position.

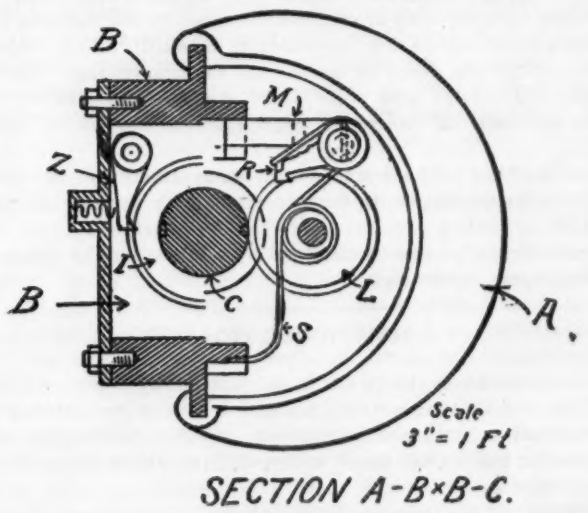


FIG. 3.—CROSS SECTION.

When the drill is in such position that the operator cannot work to advantage, an extra appliance can be attached. In the cuts attached, Fig. 1 is an elevation, showing mode of operation; Fig. 2, a vertical section of the drill through the working parts, and Fig. 3 a cross section. In the operation of the drill, when drill-bar C is raised, the pawl Z engages with ratchet on spiral slot and rotates drill-bar, while in the descent the wheel with straight slot is engaged, preventing the bar from turning back. These slots are so arranged that the drill makes 32 strokes before striking again in the same place, thereby insuring a

perfectly round hole. The motion of the machine is obtained by turning crank W, which rotates cam shaft and cams D (fly-wheel Y being on this shaft) Cam D, passing under collar E, raises drill-bar C, compressing spring F between collar G and bottom of gear box, also feed arm P and bar O the full height of stroke. As cam D passes under collar E, spring P returns bar C until collar G strikes rubber ring H, which is to cushion the blow, providing drill X has not touched the substance to drill.

When the feed arm P rises with bar C, it carries feed bar O between rollers and forces the plunger out to lever N, fulcrumed to frame B. At the lower end of N is feed-bar M carrying pawl R, which, by this motion, is carried in a lateral direction and rotates feed ratchet I, thereby drawing cross-head B B, by means of screw J and nut K, downward through cross-head A A, but unless the tapers on bar O descend below the center of feed-roller, no motion is imparted to the feed lever, and the cross-head B B remains stationary until the drill removes enough material to allow the tapers to fall below the center of sheaves, crank Q being used to return cross-head to the starting point.

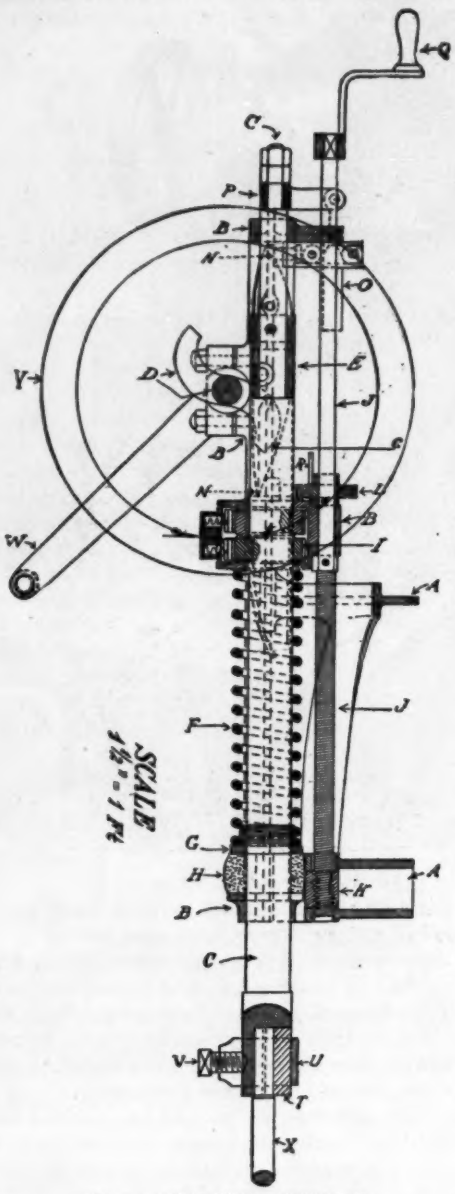


FIG. 2.—VERTICAL SECTION.

The King rock drill is the invention of Edward P. King, Superintendent, and is the fruit of six years of persistent experimenting. The drill was so well thought of by those who were early made acquainted with its features that orders were sent in before all arrangements for filling them had been completed.

Four sizes of the drill are made, from A, operated by one man, with two strokes to the revolution, to D, for two men, both having one stroke to the revolution.

Further information can be obtained by addressing the King Rock Drill Co., 36 Water street, Pittsburgh, Pa.

A NEW DRILL HOLDER.

The Cleveland Twist Drill Co. have just brought out what they have christened the "Old Reliable" drill holder, a device for holding twist drills when using them on work held in a lathe. In this holder, the lathe center enters the center hole in the shank of the drill, and thus the drill must be in

a true line with the centers of the lathe. There are four sizes designed to hold drills from ¼ inch to 2 inches inclusive. The "Old Reliable" is to be distinguished from the "sleeve holder," a more expensive tool, but in some respects superior, brought out about a year ago by the same company.

ADVANCE NOTES OF THE WORLD'S FAIR.

Special World's Fair Commissioner Alexander Campbell has returned from Australasia, and reports great enthusiasm over the Exposition. New South Wales, South Australia, Victoria, Queensland, New Zealand and Tasmania are all making extensive preparations. Three new steamers between Sydney and San Francisco are about to be put on.

Michigan's building will measure 100x140 feet and be three stories high. It will be constructed of Michigan material, which, with the furnishings, will be donated. Though but $20,000 of the appropriation will be devoted to its erection, it will in reality be a $50,000 building.

We have not heard anything for several weeks of the proposed combination of the colonies in a national Australian display at the Chicago World's Fair, but we hope that this matter will not be allowed to slide until irrevocable arrangements are made for the separate representation of the colonies. The forthcoming Exhibition is to be a collection of very big things, and nothing but big things are likely to command very much attention. It would, therefore, be a fatal mistake for the colonies to suppose that they will make anything like a proper impression upon the visitors to the Exhibition by allowing petty provincial ideas to sway them, and by arranging for separate and distinct representation in a series of small courts instead of combining to make an effective united display worthy of this great country. We hope that at least the arrangements for displaying the mineral wealth of these colonies, and at the same time securing information likely to prove of value to us in the treatment of ores, and so on, will be of federal rather than a provincial character. —[Australian Mining Standard, Sydney, N. S. W.

At a meeting of the Board of Management of the British Iron Trades Association a letter was read from the Secretary to the British Commission on the Chicago Exhibition, requesting the Association to co-operate in bringing together a representative collection of British minerals and metals to be shown at Chicago, and intimating that "as the collection once formed would be presented to an American museum, the Commission believe it is worth while to take some little trouble to carry the suggestion into effect." It was resolved to bring the matter under the notice of the members of the association, and to invite them to send in typical samples towards a general collection as proposed. The president was requested to prepare and read, at a special meeting of the association, a paper on the Chicago Exhibition from the point of view of the iron and steel industries of the United Kingdom, the meeting to be called to discuss the papers in May next.—[London Colliery Guardian.

The principal part of the Bethlehem Iron Co.'s space at Chicago will be devoted to marine work. A battle ship shafting 125 feet in length, specimens of armor plate, guns, projectiles and various naval appliances will be shown. An armor plate ingot weighing about 100 tons will be an important item. The company will also erect a full-sized model of their famous 125-ton steam hammer, said to be the largest in the world.

An Ohio World's Fair Commissioner has estimated that the exhibitors from his State will spend upwards of $5,000,000 in the preparation of exhibits for the Exposition.

Speaking of the steps Germany should take toward representation at Chicago, *Kuhlow's German Trade Review* says: "One thing is certain, if German industry is to maintain our honorable position on the other side of the Atlantic, then the necessary steps should be taken without loss of time. It is intended to suggest to the Reichstag the advisability of a further contribution to the expenses of the exhibition, but it seems very doubtful whether the majority do not feel that sufficient has already been done in the way of state aid. It is by no means a long time before the Exhibition is opened, and as it is some very great efforts will have to be made so as to be ready in time."

Bulgaria has decided to take part in the Exposition. Foreign participation, so far as ascertained, embraces 72 nations and provinces.

Canada has been given 68,471 square feet of space in the various buildings, exclusive of space yet to be granted in the agriculture and live stock departments.

Bond & Co., 576 Rookery, Chicago, will send, postpaid, on the receipt of 50 cents, a 400 page advance guide to the Exposition, with engravings of the grounds and buildings, portraits of its leading spirits, and a map of the city of Chicago; all of the rules governing the Exposition and exhibitors, and all information which can be given out in advance of its opening. Other engravings and printed information will be sent subscribers as published.

The Maryland's World's Fair Board says in its report to the Legislature, asking for an appropriation of $100,000: "It has been suggested by his Excellency the Governor, and the suggestion has met with much favor, that the old Senate Chamber of the State House be reproduced in our building, and that a group of 32 figures be made to represent the surrendering by Washington of his commission, which took place in that historic hall."

Lieut. Baker, of the Marine Section of the Department of Tranaportation, has secured a promise from the Detroit Dry-Dock Co. for an exhibit of a perfect model in stucco of the entire shipbuilding plant of the company, both at its Detroit and Wyandotte yards.

Mr. Ossian Guthrie, of Chicago, and other scientists, declare that no more striking proofs of the glacial epoch exist in this country than are seen in the Desplaines valley, between Chicago and Joliet. For educational reasons Mr. Guthrie advocates the making of an exhibit demonstrating this fact at the World's Fair, with maps, surveys and collections of geological specimens, which are abundant, so arranged as to show the lines of glacial progress. This, he estimates, would require about $10,000.

THE production of pig iron for 1891 in the German Empire, including Luxemburg, was 4,452,019 metric tons of 2,205 pounds, as against 4,563,025 tons in 1890, or a decrease of about 2½ per cent, as compared with 8 per cent. in Great Britain and 9 per cent. here for the same time.

HOME AND FOREIGN LABOR COSTS IN IRON MAKING.

In commenting on some figures made by the Bureau of Labor Statistics, of the United States, on the relative efficiency of labor employed in making pig iron in different countries, the London *Colliery Guardian* says:

It is no new thing to find that high wages do not mean dear labor, and low wages do not mean cheap labor. It has, on the contrary, been demonstrated by some of the most experienced industrials and engineers of the day that high wages may, and often do, coincide with cheap labor, and *vice versa*. The late Thomas Brassey, who had an unique experience of the cost and conditions of labor capable of being readily tested and estimated in nearly all parts of the world, had apparently made up his mind that, as between the cheap labor of the Continent and the dear labor of England and the United States, as measured in terms of money, there was not much difference when measured in terms of efficiency, and this view of the case has not been greatly impugned by the later experience of other employers on a large scale. The problem, however, is not easy of solution. There are so many different considerations to be taken account of in attempting to estimate the cost or value labor, apart from the mere matter of daily or weekly wages, that it is difficult to arrive at a really satisfactory result. It is, to begin with, next to impossible to get the physical conditions, either relevant or parallel, as between one district or another, or as between two mines or works in the same district, not to speak of the difficulty of securing identical or synchronous conditions as between one country and another, that many enquirers have been constrained to give up the attempt in despair.

A comparison is made of the average earnings per man per hour, and of the average product per man per hour, in terms of pig iron for the Northern and Southern districts of the United States, the Continent of Europe and Great Britain. The number of establishments in the United States from which returns have been received is sufficiently large to justify the belief that the results in the main are fairly typical, but this can hardly be said of Continental Europe, for which only five cases are cited, or for Great Britain, which only has three works on the list. The average earnings per man per hour vary as follows, in the cases cited:

	Dol. Dol.
In the Northern States	0.119 to 0.190
In the Southern States	0.111 to 0.132
On Continent of Europe	0.051 to 0.059
In Great Britain	0.058 to 0.100

While the average product of pig iron per man per hour for the same ironmaking regions, varies thus:

	Ton. Ton.
Northern States	.066 to .052
Southern States	056 to .154
Continent of Europe	.017 to .105
Great Britain	.079 to .130

These figures make it clear, so far as they go, that in the lower limits of efficiency of production, the United States are excelled by both the United Kingdom and the Continent of Europe, while in the higher limits the United States show considerably more efficiency. In other words, the best and the worst results are to be found on the American Continent. This, however, is after all only what might be expected. Naturally in a territory so vast as that of the United States, there is not the same concentration of industry as in either Continental Europe or Great Britain, and in remote localities, where distances interfere with successful competition, there is not much necessity to study economy with care. In other localities, however, such as Pittsburgh and Harrisburg, where the trade is more concentrated and advanced, the economic results obtained, as measured in terms of product per man per hour, are higher than in any other part of the world.

TIN PLATE DEFINITIONS.

Tin plate, or to speak more accurately, *tinned plate* or *tinned sheets*, is thin sheets or plates of iron or steel coated with tin.

Terne plate is sheet or plate iron or steel, covered with an alloy of tin and lead, usually two-thirds lead and one-third tin. It is this union of the three metals, iron, lead and tin, that gives rise to the name terne plate, *terne* being the French equivalent of the English adjective tern, meaning three-fold. The oft repeated statement that terne is from a French word meaning dull is incorrect. Terne plate, because of the presence of lead in the coating, is duller than tin plate, which is frequently called *bright plate*, but it is not this fact that gave rise to the appelation terne, but the union of the three metals.

Taggers tin is a thin tin plate, 30-wire gauge and lighter. This name is not applied, as is often stated, because the iron out of which the plate is made was at one time, and is even now, used for tags or marks. The term was originally used to designate the very thin sheet iron which ran below the gauge—"tagged on" to the regular gauge—and hence these thin sheets tinned are called "taggers tin."

There is a question as to whether the tin used forms an alloy with the iron or is only a simple coating. It seems to be more firmly attached to the iron than a mere coating would be, rarely if ever, when the sheet is properly prepared, scaling off, but requiring absolute rubbing away to remove it. It is probable that the tin coating forms an alloy with the iron.

The plates thus coated form the well known tin and terne plates of commerce, the sheets varying greatly in size, from 10″ x 14″ to 40″ x 84″; in gauge of plate from 22 to 30 for tin and terne plate, and 30 to 38 for taggers; put up in boxes containing 14 to 225 sheets and varying from 7¼ pounds to 400 pounds a box. The standard size of tin plate is I C coke plate 10″ x 14″, with 225 sheets to a box, and weigh nominally 108 pounds to a box.

Tin plate is thin sheets of iron or steel 22 w. g. to 30 w. g., coated with tin. It is called also *bright tin, tinned sheets, tinned plate*. The French name is *fer blanc* or *white iron*, a name that was at one time used in England.

Taggers tin is very thin tin plate 30 w. g. and lighter.

Terne plate is sheets of iron or steel coated with tin and lead. The proportions of these two metals and the consequent quality of the terne plates vary greatly; the more lead the inferior the plate. *Roofing plates*, from their almost exclusive use for this purpose; *Canada plates*, from their extensive use for roofing in that country, are other names for ternes.

Charcoal plates are tin plates, the iron plates of which were made of charcoal iron. But few charcoal plates are now made.

Coke plates are tin or terne plates made from puddled iron plates.

Bessemer plates, Siemens plates, open-hearth plates indicate the kind of steel out of which the plates are made.

A mender or *return* is an imperfect plate returned to the tin house to be mended or repaired.

Wasters are imperfect plates sold as such.

Black plate is the iron or steel plates or sheets as they come from the rolling mill having been cut to the proper size. They are termed *black pickled plates* after the first pickling or immersion in dilute acid. *Cold rolled* plates, after cold rolling. *White pickled plates*, after the second pickling and when they are ready for the tin pot.—[Joseph D. Weeks in "Tin and Tin Plate."

Wonderful Growth of Lake Shipping.

In his article on "The Water Route from Chicago to the Ocean," in the March *Scribner*, Lieut. C. C. Rogers, U. S. N., says:

"The history of marine architecture does not furnish another instance of so rapid and complete a revolution in the material and structure of floating equipment as has taken place on the Great Lakes since 1886. In that year the total valuation of the vessels by Lloyd was about $30,600,000. In 1889, 60 new steamers and eleven sailing vessels, aggregating 70,000 tons, and valued at $6,650,000, were added to the fleet. During the four Winters of 1886-1890, the tonnage of the lakes was nearly doubled; 206 vessels, measuring 399 975 tons, were turned out of the shipyards with a valuation of $27,389,000. During the same time the number of steamers of more than 1,500 net register tons increased from 21 to 110. The two valuations of the fleet already presented differ by more than $9,000,000; but either one emphasizes the fact of the very recent and extraordinary growth of this commerce, and renders it difficult to predict the increase in the tonnage and in the size of vessels upon the lakes during the nine years that remain till the opening of the next century. More than one-half of the vessels on the Great Lakes are assigned to Chicago, Port Huron, Detroit, Milwaukee, Grand Haven, Cleveland and Buffalo.

"The number of Canadian vessels on the lakes is 647; tonnage, 132,931; valuation, $3,989,130. For further comparison, it may be stated that the total of coast and inland shipping registered in Canada is 7,153 vessels, of 1,040,481 register tons, valued at $31,213,430.

"The increase in population of the lake ports indicates the great increase that must follow, necessarily, in the business of the lakes and also of the railways tributary to them. Buffalo has increased from about 42,000 in 1850 to 255,000 in 1890; Cleveland, from 17,000 in 1860 to 262,000 in 1890; Chicago, from 30,000 in 1850 to 1,100,000 in 1890; while Detroit and Milwaukee exhibit a remarkable parallelism in growth, the former having increased from 116 340 to 205 876 in the last ten years, and the latter from 115 587 to 204,468."

Iron Trade Troubles.

The Saugatuck Iron Co., of Saugatuck, Conn., assigned. Liabilities, $25,000.

Pierce, Kelley & Co., of Sharpsville, Pa., say they will pay dollar for dollar if given time. Frank Pierce is in charge as trustee for the creditors.

The Schweisthal bank failure at Chicago precipitated that of the Atkinson Steel & Spring Works, the assignee of Schweisthal getting judgment for $52,100 on cognovit notes. The plant at Spalding is worth $100,000 and the company says it has orders representing as much more. It is said that of $205,100 scheduled as "doubtful assets" of the bank, $190,000 is due from the Atkinson Steel & Spring Works.

The Phœnix Iron Co., at Trenton, N. J., suspended business Saturday, and on the application of Wilson D. Haven, its President and largest stockholder, a receiver was appointed. Liabilities are $136,000, and nominal assets $186,000. The Phœnix is one of Trenton's oldest iron establishments, and has earned a national reputation by the construction of numerous important lighthouses for the Government. Two are on the Pacific Coast, another is at Coney Island and the most important, costing $150,000, is at the American Shoal, Florida.

New Appliances at Pittsburgh.

Abram Reese, Pittsburgh's veteran inventor and iron manufacturer has invented a three-high rolling mill and successfully operated it. The two-high mills in vogue for 20 years required a reversible engine, and to roll a rail took about 20 passes. In Mr. Reese's mill, when the rail passes through one roll, it only needs to be started through another. The machine does not need to stop. The capacity is increased 100 per cent, and a reversible engine is not required, the cost being thus greatly reduced. It is only necessary to turn a wheel to change the mill, while on the two-high eight screws have to be set each time.

Carnegie, Phipps & Co. are about to add to the armor department of their Homestead mill a steel saw weighing 110 tons, that will cut a nickel steel armor plate as an ordinary saw walks through a plank. These armor plates range in weight from 8 to 38 tons and reach a length of 20 feet and a thickness of 20 inches. The new saw is an improvement on the one used in the Krupp works at Essen, and cost $35 000.

H. B. CROWL, analytical chemist, has opened a laboratory at No. 631 Chamber of Commerce Building, Duluth, with Chas. F. Howe, mining engineer.

THOMPSON Carriage Works, Oshkosh, Wis., burned, with $25,000 loss; insurance $20,000.

PROTECTING YOUR BUILDING With an automatic fire sprinkler system makes it absolutely fire proof. All Insurance Companies recognize the "Neracher" as the best made and will make liberal reductions on your present rates if you equip. In this way the system pays for itself inside of two years' time.

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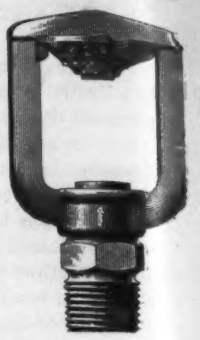

THE NERACHER SPRINKLER CO., - WARREN, O.

BRANCH OFFICES:

Boston, Chicago, St. Louis, Cleveland, Cincinnati, Minneapolis, Pittsburgh, New York, Philadelphia, Baltimore, San Francisco.

INDUSTRIAL SUMMARY.

New Enterprises:—

The following recent incorporations, specially reported for *The Iron Trade Review*, are of interest to the iron and machinery trade:

Chicago, Ill.—American Promotion Co.; capital, $1,000,000; to buy and sell patents and manufacture same; incorporators: Charles S. Graves, M. D. Stecher, Frank Patterson.

Chicago, Ill.—Newman Brothers Co.; capital, $150,000; to manufacture and sell organs and other musical instruments; incorporators: Chas. W. Newman, Gustav R. Newman, John A. Newman.

East St. Louis, Ill.—Monterey Wire Nail Co.; capital, $300,000; for the manufacture and sale of wire nails and wire goods; incorporators: Robert C. Pate, Edward B. Roth, Fred C. Burgdorfer.

Chicago, Ill.—The Automatic Novelty Manufacturing Co.; capital, $10,000; for the manufacture, sale and operation of automatic devices; incorporators: Jno. L. Kerr, Alfred N. Dale, Geo. E. Kline.

Manistee, Mich.—Manistee Emery Wheel Co.; capital, $10,000; for the manufacture and sale of emery wheels, etc.; incorporators: Emil Johnson, Jno. Trykbery, Jno. L. Arnold, all of Manistee, Mich.

West Ridgeway, Pa.—Standard Axe & Tool Works; capital, $10,000; for the purpose of manufacturing articles of commerce from wood and metal; incorporators: N. T. Arnold, L. Sykes, W. F. Lane.

Des Moines, Ia.—Carter Bros. Co.; capital, $30,000; to manufacture, buy, own and sell windmills, pumps, water tanks, etc.; incorporators: Geo. A. Carter, R. B. Carter, P. S. Carter, all of Des Moines, Ia.

Chicago, Ill.—Unity Door Check Co.; capital, $25,0000; to manufacture and sell door checks, bolts, bumpers and other hardware specialties; incorporators: Edward L. Brooks, Henry W. Mason, Chas. S. Graves.

Chicago, Ill.—Butman Furnace Co.; capital, $50,000; for the purpose of manufacturing and dealing in steam boilers, furnaces and similar articles, etc.; incorporators: Thos. R. Butman, Edward C. Quimby, Geo. Burry.

Indianapolis, Ind.—Novelty Bicycle & Manufacturing Co.; capital, $15,000; to manufacture bicycles, tricycles, velocipedes, and do general repairing, etc.; incorporators: James H. Conley, George Cruickshank, Wm. A. Wiley.

Chicago, Ill.—Taylor Cycle Co.; capital, $50,000; to manufacture, sell and deal in bicycles and supplies, sporting goods, novelties, merchandise and sundries; incorporators: Arthur A. Taylor, Walpole Wood, Wm. L. Chitty.

Freeport, Ill.—Self Feeding Thresher Co.; capital, $100,000; for the manufacture and sale of threshing machines and attachments and appliances thereof; incorporators: August Bergman, Daniel C. Stover, Frederick Dorman.

Cincinnati, O.—The Iron Castings Co.; capital, $50,000; for the purpose of manufacturing and dealing in metal castings, metal work and machinery; incorporators: Adolph Zuest, Albert Schen, G. A. Gray, Ernst Richter, Henry Marx.

Galion, O.—The Mozier Safety Signal Co.; capital, $50,000; for the purpose of manufacturing and dealing in railway semaphores, signal devices, etc.; incorporators: Albert M. Mozier, O. L. Hays, J. H. Green, A. F. Lowe, Wm. E. Talcott.

Pittsburgh, Pa.—Pittsburgh Car Wheel Co.; capital, $20,000; for the manufacturing of iron or steel or both, or any other metal, or any article of commerce from wood or metal or both; incorporators: P. H. Griffin, C. L. Magee, Geo. L. McFarlane.

Cincinnati, O.,—The American Coke Drawer Co.; capital, $50,000; for the manufacture and sale of machines for handling coke, acquiring patents, etc.; incorporators: Fred C. Weir, E. E. Wood, Nathaniel F. Goldsmith, Jos. S. Neave, A. C. Neave.

Cincinnati, O.—The Cincinnati Keyless Lock Co.; capital, $10,000; for the purpose of manufacturing and dealing in hardware of every description, etc.; incorporators: Frank Cooley, Frank O. Loveland, Walter A. DeCamp, Joseph A. Sullivan, Frank W. Burgoyne.

Scranton, Pa.—The Scranton Axle Works; capital, $150,000; for the manufacture of iron or steel or both, or articles of commerce with right to hold and enjoy such patents and rights as are necessary to carry on said business; incorporators: John Kemerer, W. L. Connell.

Chicago, Ill.—The Simpson Brick Press Co.; capital, $150,000; to manufacture, sell and deal in brick-making and other machinery, apparatus and appliances, incident to manufacture of brick, terra cotta and tiles; incorporators: Peter L. Simpson, J. L. Simpson, W. R. Omohundro.

Chicago, Ill.—Standard Battery Co.; capital, $1,000,000; to manufacture, operate, sell and license to use galvanic and other batteries and all other electrical machinery, appliances, etc., and deal in patents relating thereto; incorporators: Fred M. Bailey, Chas. A. Haslett, Sterling L. Bailey.

New York City, N. Y.—Turner Machine Co. (incorporated in West Virginia); capital, $250,000; for the purpose of manufacturing and selling mechanical tools and machinery, rotary engines, blowers, pumps, etc; incorporators: C. G. Turner, Jno. H. Booth, J. C. Nicoll, all of New York City, N. Y.

Rock Island, Ill.—Rock Island Automatic Car Journal Lubricator Co.; capital $100,000; for the manufacture and sale of automatic car journal lubricators and other articles of metal or wood; incorporators: W. B. Ullman, W. B. Ferguson, Emil Lange, Gustav Stengel, Jno. Ohlweiler, Sr., A. A. Chapman, G. E. Lambert.

New York, City, N. Y.—Hot Air Car Heating Co. (incorporated in W. Va.); capital, $1,000,000; for manufacturing and selling U. S. patented systems for heating, ventilating and cooling railway cars, steam or hot air vessels, etc.; incorporators: Wm. McLeod, Geo. R. Brine, Boston, Mass; H. Hartley, New York City, N. Y.

Collinwood, O.—The Birkenfeld Tie Framing Co.; capital, $28,800; for the purpose of framing ties for railroad and other bridges, constructing bridges, manufacturing machinery for framing ties, etc.; incorporators: Joseph F. Birkenfeld, Wm. H. Jayred, Ralph C. Shepard, Horace B. Parr, Harry J. Miller, Jno. W. Stevens, J. Wallace Lapham.

Des Moines, Ia.—Dickey Automatic Car Coupler Co.; capital, $3 000,000; for the purpose of acquiring, owning, making, selling inventions or devices for coupling automatically cars, locomotives, etc; incorporators: H. E. Teachout, S. S. Wilson, Geo. W. Dickey, C. C. Donnell, Geo. A Jewett, J. A. T. Hull, W. Lyons, all of Des Moines, Ia.

OTHER NEW ENTERPRISES.

The organization of a $25,000-stock company, to establish a stove foundry, is projected at Ashland, Ky.

The Manufacturing Construction Co., at Knoxville, Tenn., has applied for incorporation, with a capital stock of $250,000, for the construction of bridges and structural work of all kinds.

R. C. Luther and others, of Pottsville, Pa., have incorporated the Peerless Coal & Coke Co., at Elkhorn, W. Va., to develop coal mines, manufacture coke, iron, steel, etc. Capital, $150,000.

A stock company organized to build an electrical railway will erect an electric light and power plant midway between Huntington, W. Va., and Ashland, Ky. T. E. Stout, of Huntington, Secretary, can give information.

James E. York has been doing some persistent pioneering at Duluth for a big steel-making enterprise, and it is likely a plant will be put up, to make steel beams, bridge work and angle and I bars. Capacity is to be 200 tons of open-hearth steel a day. Mr. York is to be General Manager.

News of New Enterprises, Machinery Wants, Etc.:—

[NOTE.—Readers of this paper who are in need of machinery or supplies of any kind are requested to advise us of their wants, for insertion in this column.]

Inquiries sent by *The Iron Trade Review* have brought out the facts noted below, concerning companies recently incorporated for manufacturing purposes. Our advertisers and readers will find it to their advantage to watch this column. These paragraphs represent just so many opportunities for new business:

The Crossley Car Brake Co., of 15 S. Water street, Cleveland, will not erect a plant just now, but will have its brakes made for it. H. A. Crossley may be addressed.

The Rowley & Hermance Co., of Williamsport, Pa., succeed the established firm of Rowley & Hermance, manufacturing wood-working machinery of all descriptions.

The Siemens & Halske Co. of America, for the manufacture of electrical machinery, has its office at 98 Jackson street, Chicago. It reports factory already built.

Wire specialties are to be be made by the newly incorporated Aurora Wire Goods & Manufacturing Co., of Aurora, Ill. Their buildings are of brick, 212x40. They report no immediate needs.

The Peoria Foundry Co., of 1306-1314 S. Washington street, Peoria, Ill.,

ESTABLISHED 30 YEARS.

Wm. B. Pollock & Co.

Youngstown, Ohio,

MANUFACTURERS OF

STEEL IRON BOILERS EVERY TYPE.

Contractors for the Construction and Erection of

HEAVY PLATE WORK,

For Blast Furnaces, Rolling Mills, Steel Works, Mines and all Purposes.

RIVETED LINE PIPE A SPECIALTY.

ROLLS. ESTB. AND 1863 PINIONS.
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IMPROVED UPRIGHT and HORIZONTAL
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3 TO 26 HORSE POWER.
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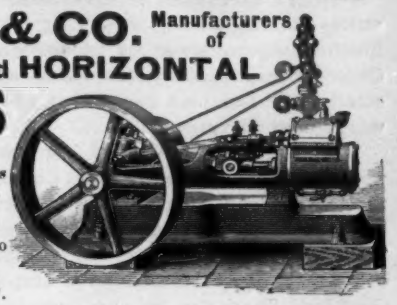

will carry on a general foundry business. Buildings 44x90 feet, to be built by April 1. A 20 h. p. engine will be needed. Ready to fill orders April 15.

J. L. Wolcott writes that the Shaw, Kendall & Co. & Buckeye Supply Co. is an established concern, with office and works at Toledo, O. Its recent incorporation was under the laws of Michigan, with headquarters at Monroe. It makes iron and brass goods.

The Masonic Temple Novelty Co., of 94 and 96 State street, Chicago, has a 30x50 brick building. Its needs are an engine of 5 h. p., 500 feet of belting, heating apparatus and lathes, 30 pulleys, one drill, 74 feet of shafting, and gold, silver and tin, which it uses in manufacture.

The Russell Self-Closing & Locking Elevator Door Co., 504 Chamber of Commerce Building, Chicago, Ill., will be ready to fill orders May 1. Plant and power will be rented. The company will make a device for keeping elevator doors closed and locked. B. M. Russell is Secretary.

The Pennsylvania Hard Vein Slate Co. have their office at 22 South Third street, Easton, Pa., and their plant at Edelman, Pa. They will manufacture roofing slate and will be ready to fill orders by July 1. They will need a steam pump soon, and boiler and hoisting engine of about 30 h. p. within the year.

The Louden Machinery Co., of Fairfield, Ia., Wm. Louden, Superintendent, will make haying tools, barn door hangers and other hardware specialties. They will build at once. Their needs are a 20 h. p. boiler, a 15 h. p. engine, 1,000 feet of belting, trip hammers, lathes, pulleys, drills, shafting, emery grinders, presses, pipe or thimble cutter.

The Neracher Wood Trimming Machine Co., of 1260 Hamilton street, Cleveland, O., will complete their building next month. It is of wood, 55x90 feet, with gravel roof. They will want a boiler 48x12, an engine of 25 h. p., 300 feet of belting, lathes, pulleys, drills, shafting, heating apparatus, milling machines, planers, saws, etc. They will be ready to fill orders in June.

Additions, Enlargements, Removals, Etc.:—

The Southern Malleable Iron Co., Chattanooga, Tenn., is erecting an addition, 100x50 feet.

The Hoppes Manufacturing Co. have commenced the erection of new shops in Springfield, O.

J. H. Cole, of Parkersburg, W. Va., is talking of removing his iron foundry, machine shops and boiler works to Bridgeport, Ala.

The foundry of A. J. Sweeney & Sons, which was to have been removed from Wheeling to Staunton, Va., will finally locate at Harvey, Ill.

The Allentown Foundry & Machine Co., of Allentown, Pa., are about to enlarge their equipment by the erection of a brick addition 30x170 feet.

The Cincinnati Tool Co. have removed from 216 to 222 West Second street to 281 Broadway, Cincinnati. With more room and better facilities they are in good shape to meet the demands of their increasing business.

John Steptoe & Co., who for many years have been located at 214 West Second street, have removed to 177-181 East Pearl street, Cincinnati, O. They have put in some new machinery, and have more room and better light.

The Sterling Steel Co., whose plant is near McKeesport, is expending $65,000 on additional shops. There will be a hammer shop, machine shop and a warehouse, to be finished by April 15. Steel projectiles will be made for the Government.

H. L. Shepard, agent, has removed from 134 East Second street to 141 and 143 West Second street, Cincinnati, and has added one new 14-foot planer and several new lathes. He reports that business has been fairly good through the Winter, and his orders now include a carload of machinery for San Francisco, Cal., and one carload for Tennessee. He is getting out two new articles that will soon be on the market.

Their experimental machinery for tinning the plates having been got into good running order, Norton Bros. have begun the erection at Maywood, Ill., of a building for use in the manufacture of tin plates. The storehouse and pickling department will occupy 85x85 feet, while the cleaning and tinning house will be 40x260 feet, affording, when fully equipped, an estimated capacity of 1,200 boxes of tin-plates in ten hours. It is hoped to have the new plant at work in about 90 days.—[American Machinist.

The Campbell & Zell Co., of Baltimore, Md., have secured the entire plant known as the Ramsey Engineering Works, located at Locust Point, Baltimore, from which they will turn out marine or stationary engines and boilers, tanks, stand-pipes, etc. Their boiler shop, machine shop, iron foundry and pattern shop are of modern construction, and equipped with the latest improved tools, traveling cranes, etc. With a water frontage, and large wharf, equipped with proper shears for hoisting all classes of heavy work, the company are in position to perform any necessary repairs to any portion of the construction of iron steamships, steamboats and tugboats. With these increased facilities, operating in conjunction with their Enterprise Iron Works, at Canton, they are enabled to meet the increasing demand for the Zell improved water tube safety boiler, and the Olsen combined feed water heater and purifier.

Fires and Accidents:—

South Bend, Ind., boiler works were damaged $15,000 by fire.

The depot of the New York, New Haven & Hartford Road, at New Haven, Conn., burned Saturday night. Loss $150,000.

At East Jordan, Mich., the boiler of the East Jordan Lumber Co.'s mill No. 2, blew up, instantly killing six men and injuring four. Loss $10,000.

At Anderson, Ind., Columbia Encoustic Tile Works were entirely destroyed by fire. Loss $85,000, with $40,000 insurance. The works will be rebuilt.

A Chicago fire on Saturday, 19th, with $90,000 loss, burnt out the Garden City Wire & Spring Co., the Dawson Pulley Manufactory and other concerns.

The great power house of the Mount Auburn & Avondale Cable Line at Cincinnati was destroyed by fire. The loss is $100,000. Traffic will cease until the place can be rebuilt.

One of six boilers at the Laclede Firebrick Manufacturing Co.'s works, in Chelteham, a St. Louis suburb, burst, killing four men and injuring four. The five other boilers were unseated and piled in a heap. The boiler had run out of water and was suddenly supplied with cold water.

General Industrial Notes:—

On March 1, there were 57,700 tons of pig iron in the warrant yards of the country. Up to March 15, 1,400 tons more had been received and 800 tons delivered.

The Paige Tube Co., at Warren, will at once rebuild the wrecked portions of its works. A complete outfit of Sterling water tube boilers, with mechanical stokers, will be bought.

Merchant & Co., Philadelphia, New York and Chicago, announce that they are now prepared to furnish roofing plates, coated under their own personal supervision, and in their own establishment in Philadelphia.

The National Tube Works Co., of McKeesport, Pa., the largest pipe and tube manufacturers in the world, are figuring on the erection of a Bessemer steel plant, and will in time be in the market with steel tubing.

Iron manufacturers and builders, representing most of the companies of New York, Brooklyn and Jersey City, have organized as the Iron League. If the men at work on one building or in one shop in the league strike, the league

will back the concern in its fight and will refuse to employ a man who has been a striker.

The Palmers, one of the largest shipbuilding firms in Great Britain, are arranging to transfer their plant at Newcastle-on-Tyne to a port in the United States. There is a rumor, also, that Rockefeller will join the enterprise.

The effect of the Reading deal is already felt in the car shops in Reading. There are now 1,000 cars on hand in need of repairs, and Superintendent Borrell has received instructions to employ 50 more men, including 30 carpenters.—[Bethlehem (Pa.) Times.

Wrought Iron Pipe Manufacturers' Association had a meeting in New York recently that resulted as others have. There were some pointed remarks about maintaining prices and a general agreement that as prices are now at or below cost they can't go lower.

After eleven weeks' idleness, 200 men resume work in the sheet and plate mills of the Mahoning Valley Iron Co., at Youngstown. The trouble between the superintendent and four men has been adjusted. The mills are at work on a large contract for the American Tube & Iron Co.

The British coal miners' strike that kept 350,000 men in idleness for a few weeks is over, and all the men are at work again except 50,000 or 60,000 in Durham, who struck against a reduction in wages. The strike was an utter failure as to its purpose of advancing the price of coal. Present quotations are even lower than before.

H. P. McIntosh, of Cleveland, Secretary of the Canadian Copper Co., writes to the *Canadian Mining Review* that the company expect to push its business vigorously at its nickel mines at Sudbury, "unless hampered by a Canadian export duty for which some of your journals are howling." The smelting of the ores containing nickel is to be carried on at the company's works near Cleveland.

The Lloyd-Booth Co., of Youngstown, O, have the contract for the entire plant of the new Corning Steel Co., at Hammond, Ind., with the exceptions of the engines and boilers. The roll trains consist of one 20″ three high sheet bar trains, two 22″ roughing sheet mills, and eight 22″ finishing sheet mills. They also have the order for one bar shear, two 126″ knife pack shears, and other machinery. A carload of tinplate machinery was shipped last week by the Lloyd-Booth Co., to the American Tin Plate Co., of Elwood, Ind., and an order has been placed with them from the United States Iron & Tin Plate Manufacturing Co., of Demmler, Pa., for one complete tinning side, including a fine Morewood tinning machine for 20″ x 28″ plates.

W. J. Burton & Co., Detroit, Mich., manufacturers of "Eastlake" metal shingles, diamond and gothic tiles, inform their patrons and persons interested in a good roofing material that they have excluded the use of oxide of iron or iron are paints, and rre painting their goods exclusively with graphite paint (ground in pure linseed oil). It is of a dark slate color, about the shade of Pennsylvania black slate, and does not fade, crack or peel off; besides it is rust and corrosive proof. The company have put in their own paint mills and do their own grinding. They believe that the large increase in sales of "Eastlake" shingles and tiles is due equally as much to the paint as to the superiority of the shingles. Messrs. Burton & Co. will be glad to send catalogue and give prices to persons interested in roofing.

"LAKE Superior Iron Ore Production for the Past Thirty-six Years, together with Receipts at Lake Erie Ports and Amount on Dock at Close of Navigation for the Past Nine Years." A handy pamphlet, just issued by *The Iron Trade Review*, 10 cents, post-paid.

THE HACKNEY POWER HAMMER.

SINGLE and DOUBLE STANDARD.

SUITABLE FOR ALL KINDS OF FORGING.

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The Hackney Hammer Co.
CLEVELAND, O.

OFFICE OF
THE STANDARD TOOL CO.,
INCREASE TWIST DRILLS, REAMERS, CHUCKS, SOCKETS,
SPECIAL TOOLS AND MACHINERY.

CLEVELAND, OHIO, 1891.

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CITY.

Gentlemen;-
In reference to the one hundred pound hammer that we have of your make we are glad to be able to state that same has given us very excellent results during the year that we have had it in use. We do a great variety of work on same and cheerfully recommend it especially where exact work is required.

Yours respectfully,
THE STANDARD TOOL C O.,
Genl. Mgr.

AKRON TUBULAR STEEL BARROWS.

STRONG, LIGHT, DURABLE.

Tray Cut from Plates; not Pressed.

The Akron Tool Co., Akron, O.

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THE RIEHLE BROS. TESTING MACHINE CO., Philadelphia, Pa.

PATENTS

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SECOND-HAND MACHINERY
For Sale.

1 Engine Lathe 25-inch Swing 14-foot Bed.
1 Engine Lathe 18-inch Swing 6-foot Bed.
1 Iron Planer 24″ x 24″ x 5′.
1 24-inch Back Geared Drill.
1 No. 4 Garvin Plain Milling Machine with Mandrels and Cutters.
1 Whiton Centering Machine.

Above Tools are in First-Class Order.

JAMES JENKS,
Dealer in Machinery, DETROIT, MICH.

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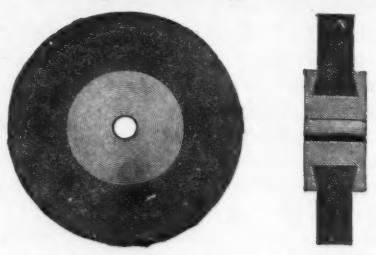
THE ACME
Safety Emery Wheel



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EMERY AND CORUNDUM WHEEL.
10 to 36 Inch Diameter.
We also make
Solid Emery & Corundum Wheels.

THE "SAFETY" FEATURE of this wheel is shown in the sectional cut, the material being dovetailed into the metal, insuring immunity from danger in case of wheel bursting. We have run a split wheel 2,800 revolutions per minute, the metallic centre retaining the material in place.

Water Wheels, Cup Wheels,
& Special Shapers to Order.

SPECIAL ATTENTION TO SAW GUMMERS.

Discount on all Centres Returned for Refilling. This means Economy. Descriptive Circulars, Price Lists and Catalogues Mailed on Application.

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Corner Fort and Beaubien Streets,
DETROIT MICH.

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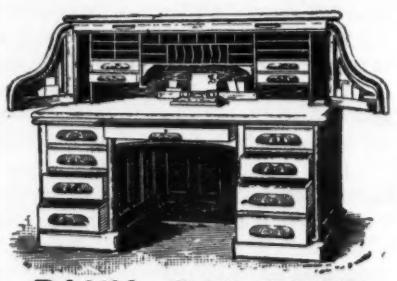
POSITION WANTED.

ROLLER on an 8″ or 10″ mill. Five years' experience. References given. Inquire BOX 10, care THE IRON TRADE REVIEW.

DESKS.



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PERFORATED METALS OF EVERY DESCRIPTION BY THE HARRINGTON & KING PERFORATING CO. CHICAGO.
284 Pearl St., cor. Beekman. NEW YORK.

IRON AND STEEL MARKETS.

PIG IRON.

CLEVELAND (f. o. b. cars, net cash, Bessemer, $15 70; No. 1 Foundry, $15 20; No. Foundry, $14 70; No. 1 Gray Forge, re, short $14 20; No. 2 Gray Forge, neutral, $14 d 20; No 1 American Scotch, $15 70; No. 2 American Scotch, $14 70.

CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1 foundry, $16 00 @16 75; Southern Coke No. 2 Foundry, $15 00 @15 75; Southern Coke No. 3 Foundry, $14 25 @15 00; Southern Coke No 1, Softeners, $15 00 @15 75; Southern Coke No. 2, Softeners, $14 00 @14 75; Ohio Silveries No. 1, $17 50@18 50; Ohio Silveries No. 2, $16 50@ 17 50; Ohio Strong Softeners No. 1, $17 25@18 00; Ohio Strong Softeners No. 2, $16 75@17 50; Lake Superior Charcoal Nos. 1 to 6, $17 00@18 00; Tennessee Charcoal No. 1, $1700@18 00; Tennessee Charcoal No. 2, $16 50@17 50; Southern Standard Car Wheel, $21 00@23 00; Tennessee Standard Car Wheel, $00 00@00 00.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $14 25@14 75; Southern coke, No. 2 and No. 1 soft, $13 25@$13 75; Hanging Rock Coke, No. 1 foundry, $16 00@16 50; Jackson Co. Stone Coal, No. 1 foundry, $16 50@17 00; Tennessee Charcoal, No. 1 foundry, $16 75@17 00; Hanging Rock Charcoal, No. 1 foundry, $19 75 @20 00. MILL IRONS—Standard Southern Coke, grey forge, $12 00@12 25; Standard Southern Coke, mottled, $12 00@12 25; Cold Short Southern Coke, grey forge, $11 75@12 00; Strong Ohio Neutral Coke, grey forge, $15 00@15 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $19 00@20 00; Tennessee Car Wheel, $17 50@18 00; Lake Superior Car Wheel, $19 00@19 50.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $16 25@00 00; Mahoning and Shenango Valley strong, No. 2 Foundry, $15 25 @00 00; Ohio Softener No. 1, $16 20@00 00; Ohio Softener No. 2, $15 20@00 00; Jackson Co., Silvery No. 1, $18 00@00 00; Jackson Co. Silvery, No. 2, $17 00@00 00; Lake Superior Charcoal, $17 50@18 50; Tennessee Charcoal, $18 25@00 00; Southern Softener No. 1, $15 50@00 00; Southern Softener No. 2, $14 75@00 00; Southern Strong No. 1 Foundry, $16 50@00 00; Southern Strong No. 2 Foundry, $15 50@00 00· Alabama Car Wheel, $19 75@20 75; Hanging Rock Char coal, $21 00@22 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $14 00@14 25; Southern coke No. 2, $13 00@13 50; Southern coke No. 3, $12 75@13 00; Mahoning Valley (Lake ore mix,tures), $00 00;00@00 Southern charcoal, No. 1 $16 00@17 00; Southern charcoal, No. 2, $15 50@16 00; Missouri charcoal, No. 1, $17 00@17 50; Missouri charcoal, No. 2, $16 50@17 00. FORGE—Neutral coke, $12 50@12 75; Cold short, $12 25@12 50; Mottled, $11 50@12 00. CAR WHEEL AND MALLEABLE—Southern (standard brands), $18 00@ 18 50; Southern (other brands), $17 00@17 50; Lake Superior, $19 50@20 50.

ST. LOUIS (reported by Rogers, Brown & Meacham): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 25@15 50; Southern Coke No. 2, $14 25@14 50; Southern Coke No. 3, $13 50@14 00; Southern Grey Forge, $13 00@ 13 25; Southern Charcoal No. 1, $17 00@17 50; Southern Charcoal No. 2, $16 25@16 75; Missouri Charcoal No. 1, $15 50@16 00; Missouri Charcoal No. 2, $15 00@15 50; Ohio Softeners, $18 00@ 19 00. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $19 50@20 00; Southern, $19 50@ 20 00. CONNELLSVILLE COKE—East St. Louis, $0 00; St. Louis, $5 65.

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $17 00@18 00; Lake Superior (coke) Bessemer, $16 50@17 00; Katahdin (Maine charcoal), $00 00 @00 00; Lake Superior Coke, Foundry, all ore, $17 00@18 00; Lake Superior Coke, Foundry, all ore, $00 00@00 00; Standard Ohio Black Band, $17 50@18 00; Southern No. 1 $15 25@15 50; Southern Gray Forge, $13 50@ 14 00; Jackson County (Ohio) Silvery, $18 00@ 18 50; Old Car Wheel, $00 00@00 00. Connellsville Coke, $0.00.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 00@ 14 50; Southern Coke No. 2 Foundry $13 00@ 13 50; Southern Coke No. 3 Foundry $12 50@ 12 75; Grey Forge, $12 00@12 25; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $15 75@16 75; Car Wheel, $18 00@19 00.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $15 25@15 50; No. 2 Foundry, $14 25@14 50; Grey Forge, $13 00@13 25; White and Motfled, $12 25@12 50; Warm Blast Charcoal, $18 00@22 00; Cold Blast Charcoal, $22 00 @27 00; Bessemer, $14 50@15 00.

MERCHANT IRON AND STEEL.

Flat Bar

1½ to 4 by ⅜ to 1 inch	1 70
4½ to 6 by ⅜ to 1 inch	1 85
1½ to 6 by 1¼ to 2 inch	2 15
1¼ & 1½ by ⅜ to ¼ inch	1 85
1 & 1¼ by ⅜ to ¼ inch	1 95
⅝, ¾ and ⅞ by ⅜ to ¼ inch	2 15

Round and Square.

1 to 1⅞ inch	1 75
2 to 2⅜ inch	1 95
2⅜ to 3¼ inch	2 25
3⅜ to 4 inch	2 75
4¼ to 4⅜ inch	3 25
4⅜ to 5 inch	3 45

Ova

⅜ to 1¼ inch	2 15
⅜ to ¾ inch	2 25
½	2 55
⅝	2 95

Half Oval and Half Round.

⅜ to 3 inch	2 85
⅜ to 1¼ inch	2 45
½ to ¾ inch	3 05
⅝	3 25
¾	4 75

Heavy Band.

¼ to 6 by ¼ and 5-16 inch	1 55
¼ to 1½ by ¼ and 5-16 inch	2 05
½ to ¾ by ¼ and 5-16 inch	2 25
to ¾ by ½ and 5-16 inch	3 75

Hoops.

1¼ to 4, Nos. 13 to 15	2 55
1¼ to 2, Nos. 16 to 18	2 65
1¼ to 2, No. 19	2 75
1¼ to 2, No. 20	2 85
1¼ to 2, No. 21	2 95
1¼ to 2, No. 22	3 05
15-16, I and 1⅛, Nos. 13 to 15	2 75
15-16, I and 1⅛, Nos. 16 to 18	2 85
15-16, I and 1⅛, Nos. 19 and 20	2 95
15-16, I and 1⅛, No. 21	3 05
15-16, I and 1⅛, No. 22	3 15
⅞, Nos. 13 to 15	2 95
⅞, Nos. 16 to 18	3 05
⅞, Nos. 19 and 20	3 15
⅞, No. 21	3 25
⅞, No. 22	3 35
13-16, Nos. 13 to 15	3 15
13-16, Nos. 16 to 18	3 25
13-16, Nos. 19 and 20	3 35
13-16, No. 21	3 45
13-16, No. 22	3 55
¾, Nos. 13 to 15	3 25
¾, Nos. 16 to 18	3 45
¾, Nos. 19 and 20	3 55
¾, No. 21	3 65
¾, No. 22	3 75
11-16, Nos. 13 to 15	3 55
11-16, Nos. 16 to 18	3 65
11-16, Nos. 19 and 20	3 75
11-16, No. 21	3 85
11-16, No. 22	3 95
⅝, Nos. 13 to 15	3 75
⅝, Nos. 16 to 18	3 95
⅝, Nos. 19 and 20	4 05
⅝, No. 21	4 15
⅝, No. 22	4 25
⅝, No. 23	4 45

Light Band.

1½ to 6 by ⅛ to 3-16 in	2 20
1½ to 6 by Nos. 11 and 12	2 30
1 to 1¾ by ⅛ to 3-16 in	2 40
1 to 1¾ by Nos. 11 and 12	2 50
⅝ and 13-16 by ⅛ to 3-16 in	2 70
⅝ and 1 3-16 by Nos. 11 and 12	2 80
¾ and 11-16 by ⅛ to 3-16 in	3 00
¾ and 11-16 by Nos. 11 and 12	3 10
⅞ and 9-16 by ⅛ to 3-16 in	3 30
⅞ and 9-16 by Nos. 11 and 12	3 40
⅛ by ⅛ to 3-16 in	3 60
⅛ by Nos. 11 and 12	3 70

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	2 80
⅞ inch, " " " 13 and 14	3 00
¾ inch, " " " 11 and 12	3 10
¾ inch, " " " 13 and 14	3 30

Sheet Iron:

No. 10 to 14	2 45
No. 15 to 17	2 55
No. 18 to 21	2 75
No. 22 to 24	2 85
No. 25 to 26	2 95
No. 27	3 25
No. 28	3 50

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 25
C No. 1, " "	2 40
C H No. 1 " "	2 50
C H Flange, " "	3 50
Extra Flange, "	4 00
Solid Fire Box "	4 75

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 25
Shell	2 50
Flange	2 75
Marine Flange	3 00
Fire Box	4 00

Above includes plates 90 inches wide.

90 to 96 in. wide	¼c lb	extra
96 to 100 in. wide	1 c	"
100 to 104 in. wide	1¼c	"
104 to 116 in. wide	special	

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	68
9-16 to ⅞ in "	68½
7-16 to ⅝ and 2⅜ to 3 in	09
3⅛ to 4 in	09½
⅝ to 11-16 and 4⅜	10
⅛ to 6 in	10½
¼ to 9-32 and 6⅛ to 7 in	11
3-6 in	13

Flats.

	cts. lbs
2 to 9-16 wide by 2 to ⅛ thick	8

Bessemer and O. H. Steel.

Machinery	base price,	2 35
Tire	"	2 25
Spring	"	2 80
Sleigh Shoe	"	2 50
Toe Calk	"	2 35
Cutter Shoes, tapered and burr.	"	2 75

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	15c

Burden Boiler Rivets.

⅛, ¾, 11-16 and ¾ inches diameter	4 00
Bridge ⅛, ⅝, 11-16 and ¾ inch diam	4 00

SCRAP IRON AND OLD METAL.

	NET TONS
No. 1 R. R. wrought scrap	$18 00
No. 1 wrought scrap	16 50
No. 1 Machine cast scrap	11 50
Iron axles	23 50
Axle turnings	13 50
Wrought turning (free from cast)	11 50
Cast borings	8 00
Uncut wrought iron boilers	11 50
Steel boiler plates	16 00
Grate Bars	8 00
Pipes and flues (Clean)	12 00
Tank iron	12 50
Hoop and band iron	9 50
Sheet iron	8 50
Wrought drillings	11 00
Malleable iron	9 50

Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	11 00

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MANUFACTURERS OF
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Perfection Saw Gummers.
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Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 12

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's.....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single.....dis 40
Shults Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50&10
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 12

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¾".....dis 50&10
Morse Taper and Straight shank Larger than 1¾".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F. FF.
Kegs, ₩ lb	4 c	5 c	2½c
½ kegs ₩ lb	4½c	5½c	2¾c
¼ kegs ₩ lb	4¾c	5¾c	3 c
1 lb cans, 10 in case	6 c	6¾c	5 c
1 lb cans, less than 1	10 c	10 c	7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@50&10

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 35
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
ndustry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	2½
Hexagon	13½	11½	8½	6	5½	5	5
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ₩ lb add ½c., 1lb boxes add 1c to list.

Nails (wire.

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate
{ Car lots.....$2.30
{ Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 12@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 40

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ¼ inch and over.....₩ lb 15¾
Sisal, ¼ inch and over .....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis45@50
H. H. Barton's.....dis40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@10
" Band.....dis 20
" Scroll .....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 30
Atkins' Cicular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 25c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 72½
Round head iron.....dis 67½
Flat head brass.....dis 72½
Round head brass.....dis 65
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5-25
Hussey & Binns, railroad.....dis 8.00

Taps.

	Hand and Nut to 2 in.			
Cards,				dis 50
Carpenters'	"	"	"	dis 50
Morse	"	"	"	dis 50
Pratt & Whitney	"	"	new list	dis 10
Machine Screw Taps				dis 55
Pipe Taps to 2½ in.				dis 70
Stay Bolt Taps				dis 25
Stove Bolt Taps				dis 50
Pulley Taps				dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ⅜ lb Balls	21c@29c	
No. 18 " " ½ and ½ "	18c@28c	
No. 36 " " ½ and ½ "	16c@27c	
2-Ply Hemp, ¼ & ⅜ lb Balls (Spring Twine)	11½c	
3-Ply " 1lb Balls	12@12½c	
3-Ply " 1½ lb Balls	11@11½c	
Cotton Wrapping, 5 Balls to lb	15@16c	

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 25

Wire.

New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75&5
" " Nos. 27@36..dis 75&10&5
Coppered Nos. 0 to 18, market list..dis 70@70&5
Galvanized Nos. 0 to 18 " " .....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 12 to 14.....dis 75
Stub's Steel Wire, regular.....$6.00₩ bbl dis 5

Wrenches.

Coe's genuine, ...dis 30
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10, & 5
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis
William's " " .....dis
Alligator " " .....dis

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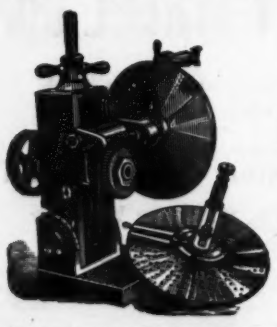
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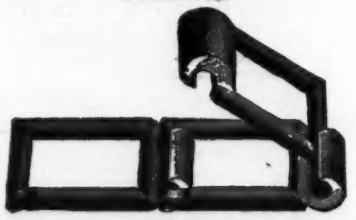
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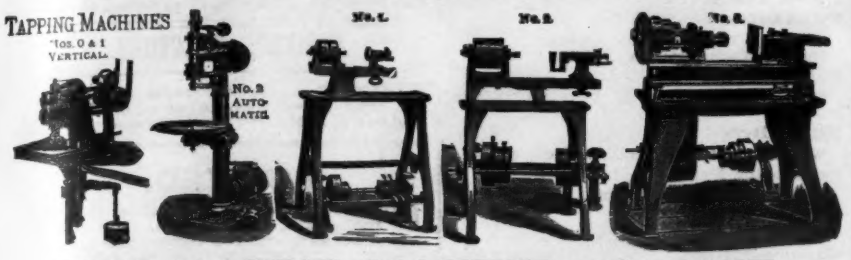

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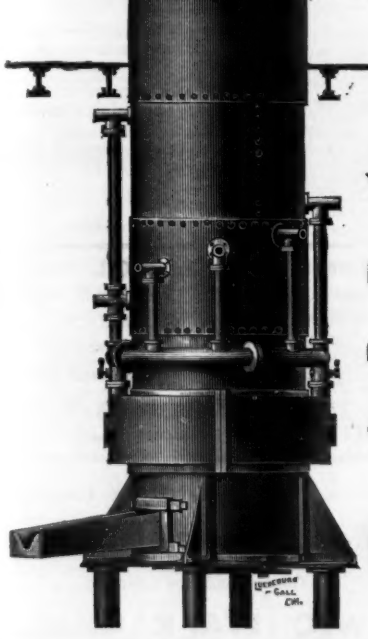

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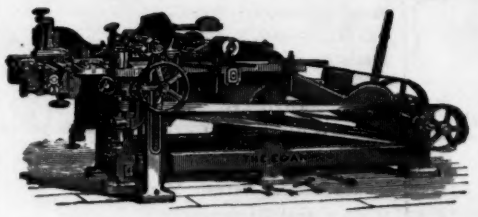

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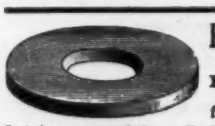

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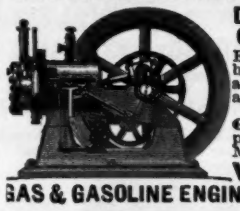

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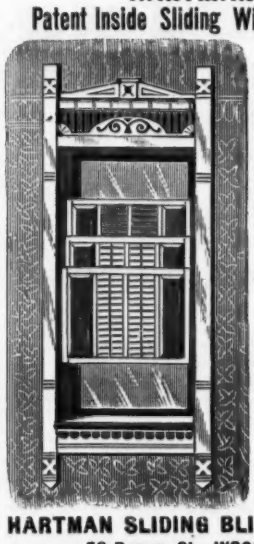

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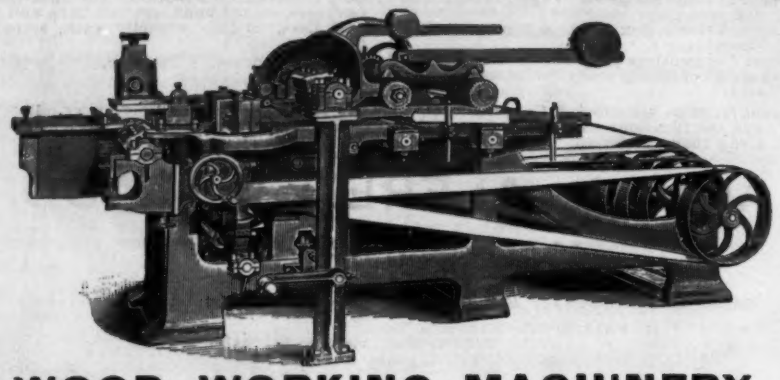

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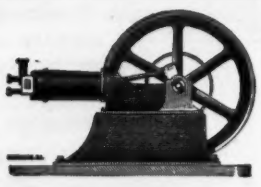

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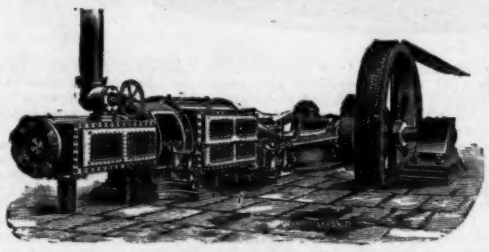

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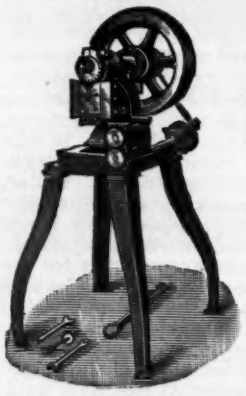

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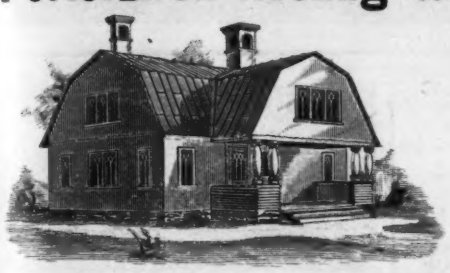

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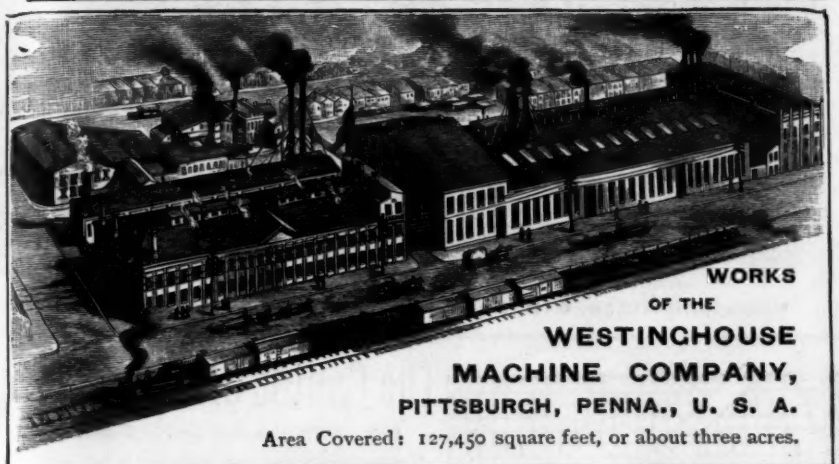

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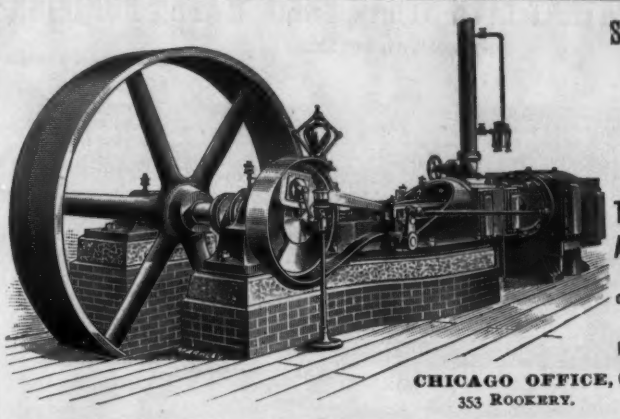

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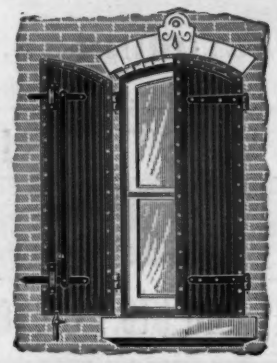

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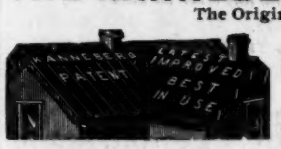

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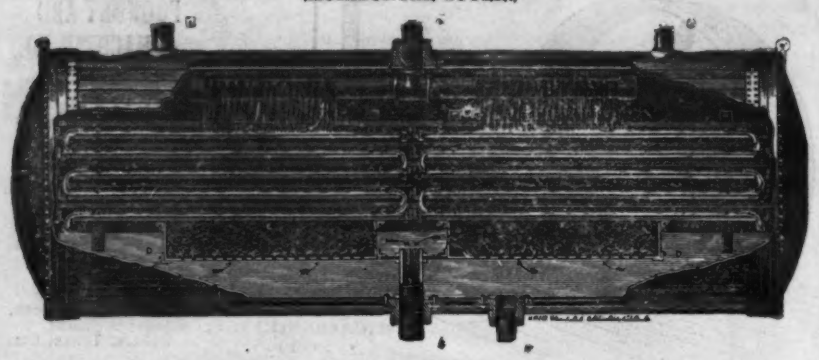

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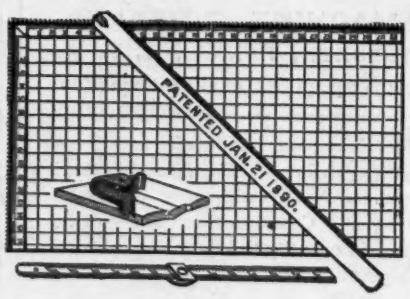

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